Pit and Quarry

With which is consolidated CEMENT-MILL & QUARRY

Member Audit Bureau of Circulations

Read in Largest Number of Plants

Published Biweekly on Wednesday for Producers and Manufacturers of Sand, Gravel, Stone, Cement, Gypsum, Lime, and Other Non-Metallic Minerals.

Subscription price: $5 for 3 years, $2 for 1 year in the United States and possessions, North, Central and South America; elsewhere $1 additional for each year. Single copies 20c.

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S. A. PHILLIPS, *Directing Editor* — ARTHUR J. HOSKIN, *Editor*

W. E. TRAUFFER, *Assistant Editor* — G. B. MASSEY, *Associate Editor*

HARRY F. UTLEY, *Assistant Editor* — G. F. SONDRAKER, *Associate Editor*

New York Representatives:
E. M. BUCK, 71-38 Austin St.; Telephone BOULEVARD 5259; Forest Hills, L. I., N. Y.
V. A. LESLIE, 301 W. 108th St.; Telephone ACADEMY 7990; New York, N. Y.

Cleveland Representative:
W. E. COATES, 2198 Elbur Road, Lakewood, O.

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Lime Association in Session at Chicago

IMPRESSIVE ADDRESSES HEARD

The twelfth annual convention of the National Lime Association is being held June 3 and 4 at Edgewater Beach Hotel, Chicago. All sessions are being held in the Michigan Room.

Norman G. Hough

Bernard L. McNulty, chairman of the board, is presiding at the convention. Addresses heard on the first day, Tuesday, June 4, included a "What's Ahead" series. "What's Ahead for the Lime Industry?" by Norman G. Hough, president and general manager of the association, was the first talk, followed by "What's Ahead for Chemical Lime?" by W. V. Brumbaugh, assistant secretary; "What's Ahead for Agricultural Lime?" H. A. Huschke, director, agricultural department; and "What's Ahead for Construction Lime?" by C. E. Ellsworth, construction engineer for the association. The radio salute dinner was held at 7 o'clock on the evening of June 3, with Col. George T. Buckingham, prominent attorney and Chicago civic leader, as guest speaker. The members also listened in on the Westinghouse salute to the lime industry which came over the radio on a national chain hook-up later on in the evening.

"The Lime Industry's Publicity Campaign," by W. J. Chandler, director of merchandising, Thomsen-Ellis Co., Baltimore, Md., held the attention of the members on the second, and final, day of the convention. Charles Warner, lime industry representative on the National Business Survey Conference, gave his report and the gathering closed with the preparation of the year's budget, election of directors and other business details.

Six Killed in Explosion at West Virginia Quarry

Six persons—two workmen, a youth and three children—were killed May 17 by an explosion of dynamite at a rock quarry near Union, W. Va.

Six cases of dynamite in a blacksmith shop used for road-construction work exploded. The two workmen were in the shop when the blast occurred. Their bodies were blown into fragments.

The bodies of three children of Mrs. Bella Wiseman, a widow, living near the quarry, were found near the building. A son of Frank Weile, of Salt Sulphur Springs, W. Va., who was employed as a water boy in the construction job, was the other victim. He lived for a few minutes after the blast.

California Plant Adds Conveyors and Bunkers

Improvements representing an investment of $75,000 are being installed at the sand-and-gravel plant of the Russian River Gravel Co., Healdsburg, Cal. Included in the improvements are concrete storage bunkers and a belt-conveyor system.

Baden Sand Co. Becomes Pittsburgh Gravel Co.

The plant and offices of the Baden Sand Co., located at Baden, Pa., on the Ohio River, was recently reorganized and the name of the concern changed to The Pittsburgh Gravel Co. Officers are C. C. Patterson, president; D. M. Campbell, vice-president; and P. A. Paulson, secretary and treasurer.

Form Limestone Co. at New Braunfels, Tex.

The Landa Rock Products Co., which operates a limestone plant at New Braunfels, Tex., is a separate and distinct concern from the Landa Sand & Gravel Co. which was incorporated recently to operate a sand-and-gravel plant in Austin, Tex., although both companies have the same set of officers headed by Harry Landa of San Antonio, Tex.

St. Louis Gets 1931 Road Builders' Show

BIG MEET COMES WEST AGAIN

St. Louis will entertain the 1931 convention and road show of the American Road Builders' Association. Factors in its selection, at the annual business meeting held at Washington, D. C., last month, were the tremendous road-building programs of the central and southwestern states, and its central location and excellent convention facilities.

The meeting in January will bring to that region for the first time in years the annual gathering of highway officials and engineers of the entire nation. Attendance ranges from 20,000 to 30,000 people, and the road show, which will be staged in the St. Louis Arena, will undoubtedly attract 500 carloads of road-building machinery and equipment.

Houston, Cleveland, and Atlantic City were spirited bidders for the convention, one of the nation's largest in the industrial field.

"Careful analysis of the road-building industry revealed that the Mississippi Valley states are engaged in greater road-building effort than any other section of the country," declared Charles M. Upham, engineer-director of the Association.

"The geographical location of St. Louis is such," he added, "that we confidently expect the best representation of men actively identified with road building we have had in all the 28 years of our history. A questionnaire of our membership revealed an overwhelming majority in favor of locating the 1931 meeting in the middle west and, of the cities there, St. Louis apparently has by far the best facilities for staging the mammoth road show. We are looking forward to a great year of progress in highway work and we are glad to be able to climax the year with our annual convention in the great city of St. Louis."

J. L. Shiely Co. Builds Second Ready-Mix Plant

The ready-mixed concrete firm of J. L. Shiely Co., of St. Paul, Minn. is building its second ready-mixed plant, it is reported.

Building Permits for April Show Increase

GAIN 12 PER CENT OVER MARCH

Building and construction activities in the United States, which began to show a definite improvement in March, are continuing their upward movement, according to official building permit reports received by S. W. Straus & Co. During the month of April, permits issued in 584 leading cities and towns throughout the country amounted to $210,411,881, a gain of 12 per cent over March, when the total was $188,452,117. March in turn had gained 46 per cent over February.

The April figures are particularly significant in view of the fact that the normal trend in building permits between the months of March and April is slightly downward. The gain registered during the past month indicates that the outlook for increased building activities from now on is encouraging.

The April permits revealed a loss of 61 per cent from April, 1929, when the total was $541,343,313. In this connection, however, it should be remembered that April, 1929, like March of that year, was an abnormal month in building permits due to the excessive volume of plans hastily filed in New York, N. Y., in anticipation of the multiple-dwellings legislation pending at Albany. Excluding New York, N. Y., April, 1930, had a loss of 39 per cent from April, 1929.

The 25 cities reporting the largest volume of building permits for April showed a collective gain of 25 per cent over March. The loss from April, 1929, was 68 per cent, but again the abnormal conditions in New York, N. Y., must be taken into consideration. Excluding New York, the loss amounted to 29 per cent.

Eighteen of the 25 cities showed gains over March, Los Angeles, Cincinnati, Detroit, Seattle, Boston, San Francisco, and Pittsburgh being the only ones to fall behind. Twelve of the cities gained over April, 1929, namely, Philadelphia, Baltimore, Cincinnati, Washington, Ponca City, Okla., Jersey City, Memphis, Kansas City, Mo., Schenectady, Newark, Sioux City and Albany.

Philadelphia ranked second in volume to New York City, followed by Los Angeles, Chicago, Baltimore, Cincinnati, Washington, Detroit, Houston and Ponca City, Okla., in that order. The high rank of Ponca City, tenth in the country, is attributable to the fact that the Empire Refining Co. planned a $2,800,000 addition to its plant during April.

Twelve of the cities, Philadelphia, Baltimore, Cincinnati, Washington, Houston, Ponca City, Jersey City, Memphis, Kansas City, Mo., Schenectady, Oklahoma and Sioux City, showed gains over April, 1928.

Boston Sand-and-Gravel Firm Adds Rolling Stock

The George H. Noone Sand & Gravel Co., of Boston, Mass., has added some new rolling stock and other new equipment. The Noone pits are located in the West Roxbury district of Boston, on the southwest edge of the city proper. It is one of the few sand and gravel operations functioning wholly in the city of Boston, with the exception of some sales which are made over all of eastern Massachusetts by motor trucks and rail. The firm has adopted a triangle as a trade-mark. The three angles bear the words, Service-Price-Quality in large white letters on a black background. In the central inner circle is a big N, and circling this letter are the words, Sand-Gravel-Stone-Loam. The Noone products embrace kiln-dried sand, concrete sand, masons' sand, plaster sand, dry-screened sand, pea gravel, grits, roofing gravel, foundation gravel, 1-in. gravel, batch-mixed materials and mixed aggregate.

Will Mine Fluorspar in Colorado Rockies

NEW CORPORATION ANNOUNCED

The American Fluorspar Corp. was organized recently to commercialize an extensive deposit in the Brown's Canon mining district, Chaffee County, Colo. The fluorspar occurs as a vein between granite and rhyolite, and has been located for a length of more than one mile. This property is in its prospective stage. Three carloads of the mineral have been shipped and the returns showed it to average more than 90 per cent calcium fluoride and less than 4 per cent silica.

A pilot mill is to be built soon to prove the ore's quality. This plant will probably contain a ball mill for fine grinding and concentrating tables to eliminate the silica. With equipment of this general character, H. A. Hamilton, president, feels that a large production could come from an abundant overburden deposit of the vein material without the immediate necessity of underground mining.

In addition to Mr. Hamilton, the directors are: C. F. Smyth, Wichita, Kan.; John T. Milliken, St. Louis, Mo.; J. F. Dostal, Colorado Springs, Colo., and C. H. Hyde, Bridgeburg, Ont.

Granite-Crushing Plant Planned at Camak, Ga.

Purchase of a 67-acre tract of land in Rowan County, North Carolina, containing deposits of gray and pink granite, has been announced by B. F. Coggin and C. Comolli, of the Georgia Granite Corp.

Development of the property will begin at once, it was said. A large steel plant building will be erected and hundreds of workmen employed, according to the announcement.

BUILDING AND ALTERATION PERMITS FOR APRIL, 1930, COMPARED WITH APRIL, 1929, AND MARCH, 1930, BY STATES

State	April, 1930	April, 1929	March, 1930	State	April, 1930	April, 1929	March, 1930
Alabama	$ 557,556	$ 3,759,104	$ 556,201	Nebraska	$ 948,920	$ 1,177,840	$ 2,035,160
Arizona	856,261	1,086,276	421,665	Nevada	64,900	116,500	81,425
Arkansas	279,397	825,448	349,988	New Hampshire	49,204	280,597	52,539
California	17,823,188	26,452,637	20,103,163	New Jersey	9,844,955	11,770,416	6,469,146
Colorado	744,359	2,326,048	919,000	New Mexico	214,253	139,803	267,175
Connecticut	4,525,473	9,670,008	4,147,401	New York	52,629,094	277,278,022	44,538,946
Delaware	331,049	517,963	1,885,558	North Carolina	1,167,049	2,410,047	1,177,678
District of Columbia	4,778,720	3,513,385	3,083,040	North Dakota	515,033	479,219	112,299
Florida	1,422,784	2,653,008	1,242,683	Ohio	12,474,850	15,602,739	14,877,140
Georgia	1,201,264	1,427,159	2,583,838	Oklahoma	5,598,800	4,883,042	2,968,322
Idaho	194,341	289,255	172,557	Oregon	1,235,052	1,748,685	1,946,437
Illinois	11,046,500	38,828,841	8,773,336	Pennsylvania	16,134,522	14,345,724	10,705,576
Indiana	2,662,975	5,191,964	2,276,283	Rhode Island	1,287,625	2,283,865	1,746,388
Iowa	2,478,983	1,457,382	943,555	South Carolina	340,433	397,440	694,253
Kansas	1,848,324	1,669,487	1,722,012	South Dakota	487,190	215,965	224,526
Kentucky	1,200,928	2,179,650	772,555	Tennessee	3,904,824	2,466,739	3,011,853
Louisiana	643,065	949,644	1,155,889	Texas	7,002,957	20,473,472	7,734,890
Maine	468,265	361,085	226,270	Utah	527,820	1,149,385	534,720
Maryland	5,780,113	4,462,455	2,646,817	Vermont	40,000	279,000	3,000
Massachusetts	7,279,340	12,924,612	7,983,081	Virginia	1,176,421	1,465,418	1,314,892
Michigan	8,526,255	26,390,605	8,639,292	Washington	3,720,811	7,787,343	3,509,830
Minnesota	2,398,807	9,290,055	1,865,257	West Virginia	520,153	610,979	4,702,439
Mississippi	853,043	875,917	311,278	Wisconsin	6,099,898	9,860,952	3,950,349
Missouri	5,939,230	5,539,855	2,669,451	Wyoming	184,332	123,365	48,859
Montana	402,565	1,404,913	294,105	Totals	$210,411,881	$541,343,313	$188,452,117

Highway Construction Contracts Show Gain

FIRST QUARTER ENCOURAGING

Reports received by Secretary of Commerce Lamont from the governors of thirty-five states indicate striking activity in highway construction. Thirty of the thirty-five states report increases, with sixteen governors announcing contract awards for the first quarter of the year 100 per cent or more above those for the same period of 1929.

Contracts awarded for the first three months of 1930 aggregate $114,-101,383, as compared with $50,910,133 for the corresponding period of last year, a net increase of slightly more than 124 per cent for the states that have reported so far, which cover about three-fourths of the country.

The greatest relative increases are shown in Ohio and Idaho. In the Buckeye state the awards for the first three months this year were approximately eleven times greater than those for the same period of 1929. Idaho shows an increase of more than ninety times, but the amounts involved are not very large. During the 1929 period Idaho spent $1,968, while this year contracts were awarded to the extent of $182,000.

Pennsylvania, with contracts awarded valued at $15,469,853 for the first quarter this year, against $2,282,813 in 1929, has the greatest dollar value among the states reporting increases.

Contracts for highway construction in New Hampshire increased 775 per cent over the first quarter last year; in Washington, 650 per cent, and Colorado, 455 per cent. Other substantial increases were Oregon, 230 per cent; Maryland, 225 per cent; Iowa, 205 per cent; Wisconsin, 202 per cent; California, 181 per cent; Indiana, 165 per cent; North Carolina, 155 per cent; Missouri, 144 per cent; Florida, 109 per cent, and Virginia, 100 per cent.

New York reported an increase of 31.2 per cent, New Jersey, 31.8 per cent, and Connecticut, 46.5 per cent.

Atlantic Lime Rock Co. Will Start Production

The Atlantic Lime Rock Co. of Sandersville, Ga., is preparing to start operation at its mines located just outside the city limits of Sandersville. A side track, built jointly by the Georgia & Florida R. R. and the Sandersville R. R., has been completed. The crusher has been unloaded at the plant and is being set in a bed of concrete.

A steam shovel has begun removing overburden from the rock deposits. A four-wheel saddle-back locomotive is used to haul dump cars at the mine. A dragline will be used in removing overburden as well as in handling the lime rock into tram cars, which will be hauled by a steel cable up a long ramp into the crusher house. The cars are self-dumpers, operating on a trip, power being furnished by electric motors.

Fifty cars per day will be the output after the plant begins operation.

Georgia Granite Company Buys Carolina Deposits

Plans have been completed by Weston & Brooker Co., Columbia, S. C., to build a large crushed-granite plant on the Georgia Railway at Camak, Ga., to be in operation by September 1. The plant will be among the largest in the South, it is said, with facilities for producing crushed granite for highway construction, as concrete aggregate, and for railway ballast. An ultimate capacity of 60 cars daily is planned, with storage facilities for 80,000 tons. The company recently purchased quarries at Holton, Ga., and it is expected these will be developed when conditions warrant. It also owns other quarry property in Georgia and operates two large plants in South Carolina.

Arizona Gypsum Plaster Co. Opens New Quarries

At a reported cost of $30,000 the Arizona Gypsum Plaster Co. is opening new quarries at Curtis, Ariz., on the San Pedro River, sixty miles from Douglas. The crushing plant will have a capacity of 150 tons a day, with employment of about thirty men.

The supply of material is said to be ample for many years. Principal stockholders in the company are William Adamson of Douglas, Ariz.; A. K. Adamson of Los Angeles, Cal., and Shelton G. Dowell, the last named being secretary-treasurer.

Shell-Marl Corp. Takes Over Mobilay Company

The Shell-Marl Corp. has been organized to supplant the Mobilay Co. in the operation of an extensive deposit of marl at Nemahbin Lake near Delafield, Wis. The office of the new company is at 180 Sixteenth St., Milwaukee, Wis., and the officers are: William Ritter, president; Phillip Stephany, vice-president and superintendent; R. E. Kelly, secretary, and A. B. Roetzer, treasurer.

The marl, which is extremely fine and soft, is excavated by a clamshell crane and a dragline, conveyed, dried, screened, and ground, the finished product finding a market in agriculture to neutralize soil acidity. For this purpose the marl is applied to the soil either separately or in combination with fertilizers.

Okay Cement Mill of Arkansas Co. Altered

ADD FILTERS AND FINISH MILL

The new plant of the Arkansas Portland Cement Co. at Okay, Howard County, Ark., which went into operation late last fall, is now having slight alterations made to provide for future increases in production. As the plant is operating at full capacity to fill orders these changes are being made without interference to production.

Foundations are in place and most of the equipment is on hand for a 3-unit Oliver-United slurry filter. Each of the units is composed of 12 disks 12 ft. in diameter with a total filter area of 7,800 sq. ft. This filter will reduce slurry moisture from 47 per cent to approximately 30 per cent and will increase the kiln capacity from 2,400 bbl. to 3,000 bbl. per day. Fuel consumption and stack temperatures will also be materially reduced.

The plant was so designed that a slurry filter could be added at any time without inconvenience. Slurry will be fed to the filter by the same ferris-wheel feeder which now feeds the kiln. Slurry cake will be discharged from the filter to a 30-in. belt conveyor which will feed through holes in the side of the kiln by means of a Bessemer-type feeder. The 11-ft., 6-in. by 300-ft. kiln will be the largest on which slurry filters have ever been installed. Two Ingersoll-Rand XRE1 27-in. by 14-in. vacuum pumps are now being installed in the compressor house to be used in conjunction with the slurry filters. The entire system is expected to be in operation about July 1.

A second Allis-Chalmers 8-ft. by 7-ft. by 40-ft. Compeb finish-grinding mill will also be installed to handle the increased capacity due to the installation of the filter and any other future increase. The foundations for this mill are now being poured and it is expected to be in operation about July 15.

Plans are now being drawn up for an electric haulage system to haul material from the quarry to the plant. This will be a one-tower unit and is expected to be in operation some time during the Fall. At present all hauling is being done by a steam locomotive and dump cars.

Chubbuck Lime Company Formed at Los Angeles

The Chubbuck Lime Co., with headquarters in Los Angeles, Cal., is a new company which operates a lime plant and quarries at Chubbuck, Cal. It produces Ideal and Apex limes, Hydroseal, and No-Jell. C. I. Chubbuck is president.

Canadian Operators Acquire New Tugboat

INSTALL 140-HP. DIESEL ENGINE

Blakeney & Son, of Moncton, N. B., operators of stone and rock quarries and gravel pits in Westmorland and Albert Counties, New Brunswick, have purchased the tug *Onawana*. The name of its towboat has been changed to *Blakeson*, after the firm as an abbreviation, the department of marine having granted permission. Blakeney & Son bought the tug at Parrsboro, N. S., and there had extensive repairs made to the hull. In addition, there was installed one 140-hp. Fairbanks-Morse Diesel engine. This installation was under the supervision of John McMeekin, of Apple River, N. S., and Capt. Leonard Mills, of Advocate, N. S., engaged as engineer and master, respectively, for the season. The tug will be used wholly for towing scows and barges, laden with stone, rock, gravel and sand, from the firm's properties along Shepody Bay and Petitcodiac River to Moncton. The moving season will end about the middle of November. The firm sells the stone, rock, sand and gravel to contractors, and also uses the materials in its own building operations as a contractor. C. H. Blakeney, manager, recently retired as mayor of Moncton.

Nebraska Cement Plant Installs New Equipment

The Nebraska Cement Co., Superior, Neb., a subsidiary of the Ideal Cement Co. of Denver, Colo., recently installed two Babcock & Wilcox Sterling-type 1,000-hp. waste-heat boilers and two Green fuel economizers. These installations have considerably decreased fuel costs at this plant, which operates three 200-ft. kilns with a capacity of 850,000 bbl. per year. The changes were made under the supervision of Paul C. Van Zandt, chief engineer of the Ideal Cement Co.

Ohio's Highway Program Greater than Last Year

The road-building program on the state-highway system for Ohio for this year will be appreciably greater than last year. Already most of the system has been improved but many miles are of inadequate widths and this year 375 miles of hard-surface pavements will be built, together with 400 miles of gravel and macadam and 25 miles of grading. There are 11,400 miles of highways in the state system.

Of the $37,000,000 available for the work, $17,000,000 is to be expended on roads, $6,000,000 on bridges, and $13,000,000 on maintenance, leaving $1,000,000 for miscellaneous and overhead. The amount for maintenance should be ample to keep the system in serviceable condition throughout the state.

The personnel of the state's highway department includes: Robert N. Waid, director; Frank L. Raschig, first assistant director; R. S. Beightler, chief engineer of construction; C. C. Hadden, chief engineer of maintenance; J. R. Burkey, chief engineer of bridges; Fred Sinsabaugh, purchasing agent.

Cement Firms in France Combine in Huge Merger

A powerful cement combination was recently formed through the absorption of the Societe Anonyme des Ciments d'Allas et de Marnac, the Societe des Chaux et Ciments de l'Ariege, and the Union Commerciale et Industrielle du Languedoc, by the Societe des Chaux et Ciments du Languedoc, Paris, France, which has increased its capital by issuing $1,170,000 in new shares. The Allas and Marnac firm showed net profits of $95,614 last year and Ariege firm netted $30,907 during the same period.

The Societe des Chaux et Ciments de Tronville et Bar-le-Duc has delayed its merger with the Poliet and Chausson firm until June 30, to allow the latter company to complete details for absorbing several other firms at that time.

Gantt Gravel & Sand Co. to Construct New Plant

The Gantt Gravel & Sand Co., operating a plant seven miles west of Magnolia, Ark., will build a new plant three miles further west, it is reported. It will be in operation within three months and have a capacity of at least 1,500 cu. yd. per day.

The company contemplates the purchase of a new 1¼ yd. gas or Diesel shovel, steam locomotives to haul from pit to plant, and four miles of rail for sidetrack. The new plant will probably be all-electric and will include the most modern type of equipment. The company will also build a concrete-tile plant at Magnolia to use up excess sand from both plants. This will be in operation within a month.

To Develop Glass Sand Properties in Virginia

Walter R. Talbot, Winchester, Va., and associates are planning early operation of glass-sand properties in the western part of Frederick County, Virginia, where a large deposit has been secured. A complete mining and refining plant will be installed, including storage and distributing facilities. A company will be formed, headed by Mr. Talbot, to carry out project.

Rains, Floods Close Plants in Arkansas

RIVER DREDGING AT STANDSTILL

The heavy rains which drenched central and southwestern Arkansas last month raised rivers and creeks in that section far above flood stage, doing thousands of dollars of damage to highways and causing most of the sand-and-gravel plants to shut down for periods of from five to ten days.

The flood was especially severe on the Ouachita River along which considerable sand-and-gravel dredging is done. The pit of the Malvern Gravel Co. at Malvern was inundated and one of the draglines used for excavating was almost entirely submerged. The Arkadelphia Sand and Gravel Co., a dredging operation, was shut down for nearly a week. The recently-completed plant of the Standard Gravel Co. at Camden was scheduled to have gone into operation May 12, but had to delay its opening for more than a week because the floods made dredging in the river impossible.

Widen Highway Fronting on Boston Firm's Quarry

Rowe Brothers of Boston, Mass., who operate one of the largest rock quarries in New England, and that within the city limits of Boston (which is quite unusual), find their property fronting on a road that is to be widened by the city government. The Rowe quarry is located on Motor Route 1, Boston to Providence and New York road, in the Roslindale district. Just which side of the road, or if both sides, will be widened has not been revealed by the administration. The road has been considered far too narrow for the heavy motor traffic using it. As the quarry, itself, is located back off the road about 100 yards, the taking of a slice of the Rowe property street frontage, for the widening, would work no great disadvantage on the company. The quarry operations are being maintained on a large scale. The rock is being crushed by steam-operated machinery.

Warner Expands; Buys Building-Materials Yard

The Warner Co., Philadelphia, Pa., is carrying out an expansion program at its storage and distributing terminal to include the installation of cranes and other material-handling equipment, concrete-mixing plants, bins, etc., to cost about $100,000. The company has also recently absorbed the Wilmington, Del., building-materials division of the Edward R. Pusey Co.

Reinforced Concrete Car Flooring Tested

CEMENT CO. MAKES EXPERIMENT

Tests on a reinforced-concrete box-car floor to replace the present wooden flooring are being conducted by the Universal-Atlas Cement Co. and are attracting the attention of railway officials. Fifty guests, representing principally the traffic departments of a number of prominent rail lines, visited the Buffington, Ind., plant of the company on May 22 to inspect an experimental car.

Several months ago one of the company's regular 1,000,000-lb. capacity steel freight cars needed reflooring. As an experiment, after tearing out the original wooden floor, wooden forms were laid, and a 4-in. reinforced concrete slab was poured.

The reinforcing consisted of ⅜-in. round bars laid ¾ in. from the bottom of the forms, longitudinally and laterally, with 6-in. spacing. About 1 in. from the top wire-mesh reinforcing was inserted. The concrete was a mixture of 1 part cement to 1 part fine haydite and 1 part 1-in. haydite, by volume.

Ordinary concrete made with stone aggregate and sand averages, in weight, around 150 lb. per cu. ft.—as explained by O. H. Gosswein, technical service manager of the Universal-Atlas Co.—whereas the special concrete in this job weighs but 105 lb. per cu. ft.

The new floor in the car proved approximately 12,000 lb. heavier than a wooden floor. It is now proposed to reconstruct another car with a 3-in. haydite concrete floor and the same amount of steel reinforcement. Such a floor will have a sustaining or load strength of about 500 lb. per sq. ft. and is expected to prove 7,500 lb. lighter than the first floor. The cement company owns several hundred steel box-cars and sought the opinions and criticisms of railroad traffic men before proceeding with a general remodeling program.

This type of floor possesses a number of properties that should make it might prove as useful in car bottoms as in structural work.

A splendid dinner was served in the company's main dining room. Following this the party was divided into small groups and conducted through Plant No. 6 by J. H. Kempster, general superintendent; J. B. Lewis, assistant general superintendent, and several foremen, who carefully explained equipment and operations.

Opinions of railway officials in regard to the proposed type of floor will be prepared and are expected to prove of interest to all manufacturers of cement.

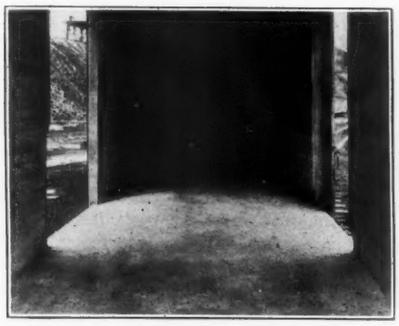
Railroad men inspecting the concrete-floored car.

superior to the ordinary wooden floor. For shipments of various kinds of loose materials in bulk it presents a smooth and durable surface suitable for manual or mechanical shoveling or scraping in unloading. It cannot splinter or become rough. For sacked shipments of any commodities there can be no injury to sacks from splinters. The suggestion was made, also, that concrete is a good insulator against temperature changes and that a flooring of concrete might prove valuable in refrigerator cars. Owing to concrete's impermeability and the ease with which it can be cleaned, the proposed floor would seem adapted to cattle or other livestock shipments.

This initial car has no joints in the entire floor. To provide for temperature changes, expansion joints were left along both sides and ends against the walls of the car, these cracks being filled with pressed asphaltic strip to prevent leakage.

Additional interest is attached to this experimental car floor because of the fact that, although the car itself met with an accident which wrenched one of the trucks loose from the frame and produced dents in one corner of the body, no trace of injury was discernible in the floor.

One point that elicited discussion was the probable "nailability" of a haydite floor for shipments of merchandise that must be spiked down securely. Ordinarily concrete would not be suitable for such cases, whereas the porosity of haydite aggregate



Interior of car, showing smoothness of the concrete floor.

Equipment Installed at Tennessee Quarry

$100,000 BEING SPENT ON PLANT

Work of installing equipment costing more than $100,000, preparatory to the opening not later than July 1 of the old John R. Dickey rock quarry at Wataugua, Tenn., which has been leased by the Holston Quarry Co., of Knoxville, Tenn., is in progress and about fifty men are employed about the quarry.

The quarry, which has not been in operation for some time, as well as 86 acres of limestone deposits, owned by Mr. Dickey, have been leased by the Holston company, which is capitalized at $400,000.

When the quarry and plant begin operating, they will have a daily capacity of 800 tons of crushed rock. A large crew of men are now at work blasting and drilling in preparation for the resumption of operations. Two rock crushers, one steam shovel, one locomotive, two 7½-ton trucks and seven large conveyor belts are included in the list of equipment.

Officials of the company, all residents of Knoxville, are: Thomas McCroskey, president; R. S. Campbell, vice-president and general manager; W. H. McCroskey, secretary and treasurer; Guy V. Keester, traffic manager. Roy Reddie, engineer, and J. M. Pirkey, superintendent, are already at Watauga and are in charge of the work now in progress.

Alabama Company Builds Sand-and-Gravel Plant

The Montgomery Gravel Co., of Montgomery, Ala., is building a new sand-and-gravel plant to be equipped with mechanical vibrating screens. Steel for construction is being supplied by the Virginia Bridge & Iron Co., Roanoke, Va.

Olympic Cement Firm Leases Silica Deposits

Balfour, Guthrie & Co., Seattle, Wash., general manager of the Olympic Portland Cement Co., has leased silica-sand deposits at Steamboat Springs, near Reno, Nev., from the Steamboat Springs Quicksilver Co. Power shovels will be used to develop the deposits, it is reported.

John P. Callaghan, Inc. Buys New Jersey Plant

John P. Callaghan, Inc., Harrison, N. J., has purchased a part of the former plant of the American Agricultural Chemical Co. at Newark, N. J., and will construct a new storage and distributing plant, including a concrete dock with mechanical handling equipment, it is reported.

Gypsum Association Succeeds Institute

NEW HEADQUARTERS IN CHICAGO

Twelve of the leading American manufacturers of gypsum products recently organized the Gypsum Association to succeed the Gypsum Institute which has had headquarters heretofore at 110 W. Fortieth St., New York, N. Y. The new organization has established headquarters at 211 W. Wacker Drive, Chicago, Ill.

The member companies represented a total of 54 gypsum-products plants in the eastern, central and midwestern states. These companies are:

American Gypsum Co., Port Clinton, O., with 3 plants.

Atlantic Gypsum Products Co., Boston, Mass., with 3 plants.

Best Bros. Keene's Cement Co., Medicine Lodge, Kan., with 1 plant.

Certain-teed Products Co., New York, N. Y., with 6 plants.

Ebsary Gypsum Co., Wheatland, N. Y., with 1 plant.

Federal Gypsum Co., Centerville, Ia., with 1 plant.

Grand Rapids Plaster Co., Grand Rapids, Mich., with 3 plants.

National Gypsum Co., Buffalo, N. Y., with 2 plants.

Oakfield Gypsum Products Corp., Oakfield, N. Y., with 1 plant.

Structural Gypsum Co., Linden, N. J., with 2 plants.

United States Gypsum Co., Chicago, Ill., with 26 plants.

Universal Gypsum & Lime Co., Chicago, Ill., with 5 plants.

The foregoing figures cover only the plants in which gypsum products are made—not the plants in which only gypsum itself is manufactured.

Henry J. Schweim has been appointed executive secretary and chief engineer of the association. He holds memberships in the American Society of Civil Engineers and the American Society of Heating and Ventilating Engineers; is chairman of the American Standards Association sub-committee on gypsum plastering specifications; and is secretary of Committee C-11 on gypsum of the American Society for Testing Materials. He was formerly with the United States Gypsum Co.

The new association's proposed activities will aim to promote the use of gypsum products in construction work and will endeavor to secure standardized building codes.

W. J. Fitzgerald, who has handled the traffic bureau duties of the former organization, will continue in that capacity with the association.

Other officers of the association are: James Leenhouts, of the Grand Rapids Plaster Co., president; C. F. Henning, of the United States Gypsum Co., first vice-president; L. I. Neale, of the Atlantic Gypsum Products Co., second vice-president; and Eugene Holland, of the Universal Gypsum & Lime Co., treasurer. The executive committee consists of the president and vice-presidents.

The first stated meeting of the Association under the new organization will be held June 10, 1930, at the Bismarck Hotel, Chicago, Ill.

Locate Gravel Deposit at Bonita Springs, Fla.

Discovery of a gravel deposit of some 6,000,000 cu. yd. and an estimated value of $12,000,000 at Bonita Springs, Fla., near Fort Myers, has been revealed by the presence at the deposit of railroad officials who are said to be negotiating over a proposed extension into the site.

The gravel deposit is reported to be the only one of its kind in Florida.

Universal-Atlas Cement Awards Plant Contract

The Universal Atlas Cement Co., Chicago, has awarded a contract to the Rust Engineering Co., Pittsburgh, Pa., for the main portion of its distributing plant to be constructed at Homestead, Pa. Plans call for six reinforced-concrete storage silos, each with a capacity of 5,000 barrels. Cement will be shipped to an unloading platform at Homestead in special cars, designed for handling the material in bulk, dumped in the bins, sacked and distributed.

Indiana Gravel Firm to Spend $40,000 on Plant

The Baker Gravel Co., of Noblesville, Ind., has plans under way to spend between $40,000 and $50,000 on improvements to its plant this summer. The firm recently leased an adjacent deposit comprising 24 acres and the improvements will be made to enlarge facilities to enable increased production.

Edgar A. Baker and Earl S. Baker, both of Noblesville, are owners of the concern, the former being actively in charge of the plant.

New Brunswick Quarries Are Facing Busy Season

The quarrying of rock at Brookville, N. B., which is one of the leading rock-quarrying sections of the maritime provinces, may be restored to capacity this summer. There are four quarries in the Brookville area, one of them of large size. Two of the quarries are equipped with kilns and railways, connecting the quarries with the Canadian National Railway, a few hundred yards away.

Rock Hill Quarries Construct New Bins

CRUSHING PLANT CHANGES MADE

The Rock Hill Quarries Co. of St. Louis, Mo., recently completed the erection of a new bin structure at its Grant Road plant. The eight bins have concrete footings with steel and timber framework and have a capacity of 130 cu. yd. each. They are used for material storage and dry batching.

Some changes were made in the crushing plant as well. A new 5-ft. by 22-ft. Good Roads revolving screen was installed and the entire plant which was formerly driven by oil engines, is being electrified.

The Rock Hill plant of this company has had a dry-batching system in operation since last fall, so designed that it can be converted into a central-mixing plant by merely installing a mixer. No other changes or additions will be necessary.

The new unit consists of a row of wooden bins with a total capacity of 1,250 tons. These discharge to a General Conveyor & Mfg. Co. belt conveyor, on 220-ft. centers, running horizontally under the bins. The conveyor discharges to a bucket elevator, of the same make, which deposits the material in bins at the top of the batching plant. The bins discharge to a 2-compartment weighing batcher equipped with a St. Louis dial scale. The batcher now discharges through a chute into trucks but is so located that it will need no alterations to discharge into the mixer when this is installed. Cement is added to the batches in sacks to be mixed at the job. A Handy Sack Baler Co. baler and a Unit sack cleaner are used. The capacity of the batching plant is 600 cu. yd. per day.

Opens Electric-Powered Plant on Platte River

The Geoorge W. Bell Co. has opened an electric-powered sand-and-gravel plant along the Platte River about 15 miles from Omaha, Neb., to which city the entire output of 30 cars per day is hauled by trucks. The company bears the name of its president, while H. F. Bock is secretary and Walter Wilke is vice-president. A general wholesale and retail business is conducted in all kinds of building materials as well.

Baltimore Plant Closed After President's Death

Owing to the death, last February, of L. A. Thompson, president, the plant of the Spa-Nola Products Co., Inc., Baltimore, Md., has been closed and the business is being discontinued permanently.

New Handbook Called "A Mighty Fine Book"

PAENS OF PRAISE CONTINUE

Praise for the new HANDBOOK continues to come in. Every day brings the publisher enthusiastic comments on the 1930 edition.

"A mighty fine book," writes C. P. Mitchell, superintendent, Monarch Cement Co., Humboldt, Kan.

"O. K.," is the terse comment of Howard Parks, president, East Texas Gravel Co., Dallas, Tex.; A. R. Diehl, district sales manager, Medusa Portland Cement Co., York, Pa.; C. E. Palmer, advertising manager, Tomkins Bros., Newark, N. J.; E. B. Winkler, manager, Lawson Sand & Material Co., Kansas City, Mo.; T. C. Barbour, vice-president and superintendent, Belle Chaney Sand & Gravel Co., Turkey Creek, La.; C. Van de Bogart, treasurer, Redding Marble Co., Bethel, Conn.; S. B. Patterson, general manager, Calcite Quarry Corp., Lebanon, Pa.; M. A. Koffman, secretary, Southwestern Portland Cement Co., Los Angeles, Cal.; F. H. Brammer, superintendent, National Stone Co., Louisville, Neb.; J. C. Downey, United States Gypsum Co., Genoa, O.; K. G. Niland, Eastern Fuel Co., Pittsburgh, Pa.; and P. D. Barnes, sales manager, Smith Engineering Works, Milwaukee, Wis.

"This Directory will be exceptionally useful and informative," says Leo A. Stack, sales agent, Lehigh Lime Co., Chicago.

"Certainly fine," writes Emil C. Schultz, manager, Rock County Sand & Gravel Co., Janesville, Wis.

"Splendid," says P. S. McDougall, general manager, Ottawa Silica Co., Ottawa, Ill.

"Very complete and interesting," according to R. C. Matthews, plant superintendent, Marquette Cement Mfg. Co., Cape Girardeau, Mo.

"Excellent," says A. T. Armbrust, purchasing agent, Universal Gypsum & Lime Co., Chicago; Clem W. Weston, president, Weston Sand & Gravel Co., Logtown, Miss.; and Roy E. Nelson, vice-president, Howard-Cooper Corp., Portland, Ore.

"Very good; and your Directory should be a great help," writes the Utah Idaho Cement Co., Brigham, Utah.

"I am appalled by the amount of information it contains," says S. A. Ionides, Denver, Colo.

"Excellent and best ever," says T. C. Gilmore, manager, Gilmore Sand & Gravel Co., Anderson, Ind.

"Very fine; best in the field," in the opinion of F. P. Hambright, sales manager, Merrick Scale Mfg. Co., Passaic, N. J.

"Great," writes the Mann Co., Inc., Norristown, Pa.

"Fine," say C. M. Lowry, superintendent, H. D. Conkey & Co., Oregon, Ill.; Wm. Click, Avoca, Mich.; M. E. Radcliff, sales manager, Canadian Aggregates, Ltd., Burford, Ont., Canada; and W. H. Taylor, superintendent, Coronet Phosphate Co., Plant City, Fla.

"I wish to compliment you on the practical comprehensive contents. Anybody connected with the quarrying industry can find a great deal of valuable and useful information in it." —E. F. Carley, advertising manager, explosives, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

"A very good piece of work," writes Paul F. Jahncke, president, Jahncke Service, Inc., New Orleans, La.

"Excellent; the most complete of its kind we have seen," says Brant Holme, manager, Bemis Bro. Bag Co., Ware Shoals, S. C.

"I am well pleased."—W. W. George, chemist, Broadford, Va.

"Very complete," is the unanimous verdict of H. H. Sherman, publicity manager, Chicago Pneumatic Tool Co., New York, N. Y.; Stanton Walker, director, Engineering & Research Division, National Sand & Gravel Association, Washington, D. C.; T. B. Carson, purchasing agent, French & Hecht, Inc., Davenport, Ia.; and C. C. Cole, sales manager and superintendent, Saginaw Lime & Stone Co., Longview, Ala.

"Good," say J. S. Burr, proprietor, John T. Burr & Son, Brooklyn, N. Y.; W. E. Smith, superintendent, Buffalo Slag Co., Buffalo, N. Y.; and E. N. Gackenbach, Jenkintown, Pa.

New Equipment Added at Norristown, Pa., Plants

Yoch & Roberts, operators of a crushed-limestone quarry and plant at Norristown, Pa., have recently added new equipment including an Ingersoll-Rand 6-in. pump and an O. K. clutch hoist.

The capacity of the crushed-stone operations of Mann & Co., Inc., Norristown, Pa., has been increased materially by the addition of two new Link-Belt type K2 gasoline shovels to supplement two of the same kind previously in use; and two more jackhammer drills.

California Silica Firm Erects Crushing Plant

The Spicky Polish Corp. of San Francisco, Cal., is shortly to develop a crushing plant on its White Rock silica deposits near Placerville, Cal., for the production of glass sand, Perry Small, president of the concern, reports.

All crushing and grinding at present is being done at the company's San Francisco plant, where crystalline quartz silica in filter stock sizes ranging from ½ in. to 20 mesh, and flour silica of 120 to 350 mesh, is produced.

Mica Producers Are Hopeful Over Tariff

TRADE STIMULUS ALREADY FELT

The proposed tariff schedule on mica which is looked forward to by producers as likely to be adopted by the present session of Congress will stimulate the North Carolina industry, according to views expressed to State Geologist H. J. Bryson by producers on a trip through the western part of the state.

Already, as a result of anticipation, the state geologist has observed an increased interest in mica that he believes will be translated into greater wealth for the state within a comparatively short time.

State Geologist Bryson was told by large mica producers that the anticipated production will not be sufficient to give complete protection from mica produced in India and other countries by extremely cheap labor, but that the situation will be aided materially and production should be speeded considerably.

A new mica property in Jackson County has been reported as having been taken over by a Philadelphia concern which is said to be preparing to spend $100,000 on development.

Observation in the feldspar producing centers by the state geologist indicate that the market is picking up this spring after having been through a depressed condition through the winter. Demand which has been slack through a period of several months is said to be on the upgrade with prospects for a gradual revival in the trade.

Ohio Woman Buys Plant of the Tressel Stone Co.

The Tressel Stone Co., operating a quarry and stone-crushing plant north of Ada, O., recently became the Taylor Stone Co. when J. G. Tressel sold his interest to Mrs. E. C. Taylor of Ada.

Mrs. Taylor has held an interest in the plant for seven years and has been active in the management. She reports that prospects are good for a large output of stone this season. A dozen men are employed.

Starts Construction on Cement Plant in Nevada

Roscoe W. Griffin, vice-president of the Boulder Nevada Holding Co., reports that construction has started on a new 1,600-bbl. dry-process cement plant located northeast of Las Vegas, Nev. The plant, according to Mr. Griffin, is located on a natural-cement deposit.

Hilltop Plant on Missouri River Yields Highest Grade of Silica Sand

Material Excavated in Noted Producing Region Analyzes 99.75 Per Cent Pure

ONE of the important operations in a district noted for its production of high-grade silica sand, is the plant of the Tavern Rock Sand Co. at Klondike, Mo. This company is also one of the pioneers in this district, the original plant having been built on the same location 33 years ago. The plant was reconstructed in 1927 and the latest type equipment installed, the present buildings, of structural steel and corrugated metal, using the original concrete foundations.

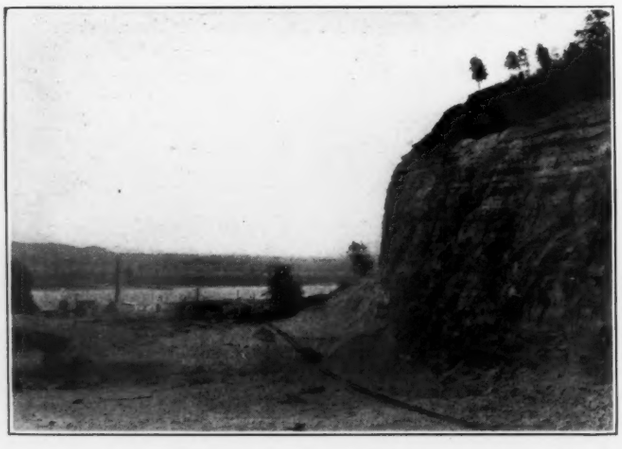
The 75-acre property is located at Klondike which is about 32 miles west of St. Charles and 12 miles east of Washington on the north bank of the Missouri River. The country is extremely hilly and the quarries are located on the top of one of the highest hills in the vicinity. The main quarry floor is about 100 ft. above the M. K. & T. Ry. tracks, on the main line between St. Louis and Kansas City, which run nearby. The plant is on the edge of the quarry overlooking these tracks and the river.

The deposit is a 99.75-per cent pure silica sand varying in depth from 15 to 100 ft. and on an almost perfectly horizontal plane. The overburden, from nil to 50 ft. in depth, consists mostly of a mixture of various kinds of rock containing practically no silica. A seam dividing the two formations simplifies their separation.

Over the rock there is clay which must be removed before the rock can be blasted off the top of the silica deposit. As the location is on a hillside the hydraulicking method has been used in the past. As the operations moved up the hill, however, the water pressure decreased and this method became less effective. A Sauerman 1-cu. yd. Crescent scraper was recently installed. This drags the clay down the hillside to the hydraulicking nozzle and has solved the problem. A 1⅛-in. nozzle on a swivel mounting is being used. This is fed by a 3-in. pipe-line with an effective pressure of 120 lb. per sq. in. The scraper is operated by a Sauerman 2-drum hoist driven by a 50-hp. General Electric motor.

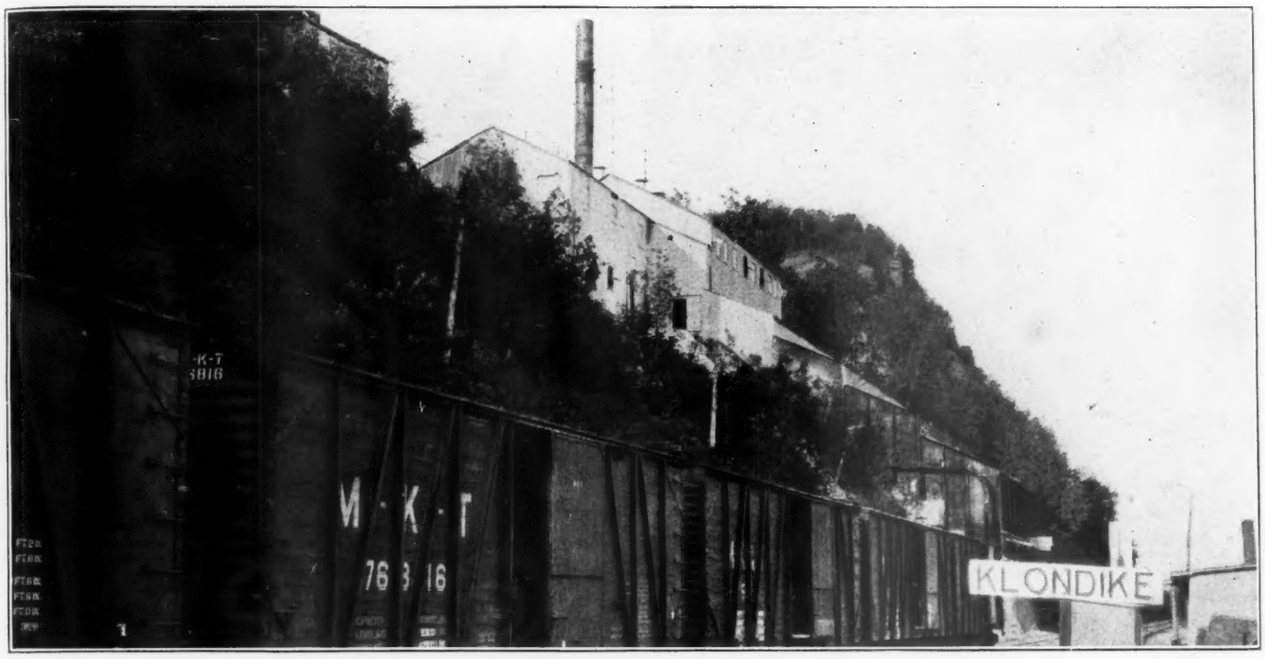
Three quarries are being worked into the hillside at one time. The purpose of this is that one may be drilled and one shot while the third is being worked. All of these are fairly close to the plant and equipment is moved from one to the other with little loss of time. The center quarry nearest the plant is being worked at present. This has a quarry face varying from nothing to 80 ft. in height. Drilling is done in 20-ft. ledges with Gardner-Denver jackhammers. About 150 ft. of face is shot at one time. Illinois Powder Co. 60-per cent Gold Medal dynamite is used for springing shots and black powder for the blasts. Some secondary drilling is necessary and this is also done with Gardner-Denver jackhammers.

In the past some difficulty was experienced in blasting this rock which is entirely free from seams or cracks. Best results have been obtained by first springing each hole at the bottom with 2 sticks of dynamite. The hole is then steamed and the wet sand pumped out. A second springing shot with about 25 sticks of dynamite is then made. The hole is again steamed and pumped. Then black powder, averaging 10 kegs to the hole, is used to roll the face, several sticks of dynamite being used to set off this powder. Sometimes a third springing shot is necessary to enlarge the hole.



Loking toward plant from north. Quarry face at right.

Gasoline shovel loading cars in quarry.



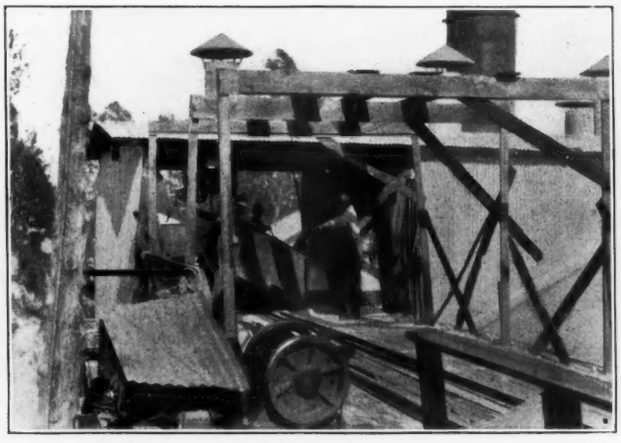
View of plant from southwest. Note the hillside construction.

A Bucyrus 20 B crawler-mounted gasoline shovel loads into Duncan 3-ton steel pit-cars of the swing-door side-dump type. These are hauled to the shovel by mules and from the shovel to the plant by gravity.

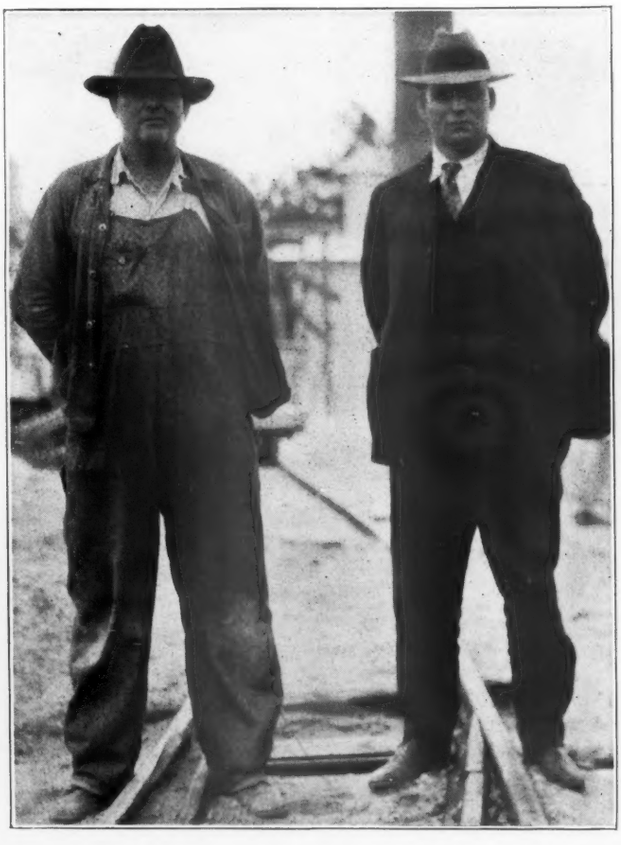
At the plant the cars are hauled onto a wooden trestle over the primary crusher by a Clyde electric car puller. They are dumped by a Chisholm-Moore electric hoist. The material goes to a small hopper feeding the Williams No. 6 Jumbo hammermill. This reduces the material to 2 in. and under, most of the product being grain size.

The hammermill discharges into a 6-ton bin. A short 48-in. belt conveyor carries the material to a bucket elevator. This in turn discharges through another hopper into the Allis-Chalmers 7-ft by 35-ft. rotary dryer, which is driven by a 40-hp. Allis-Chalmers motor through Texrope and gear drive. The short conveyor is driven by a 5-hp. motor through a Link-Belt chain drive. The dryer is oil- and air-fired by two Air-Oil Burner Co. burners. Either or both of these can be used depending on weather conditions and the amount of moisture in the sand.

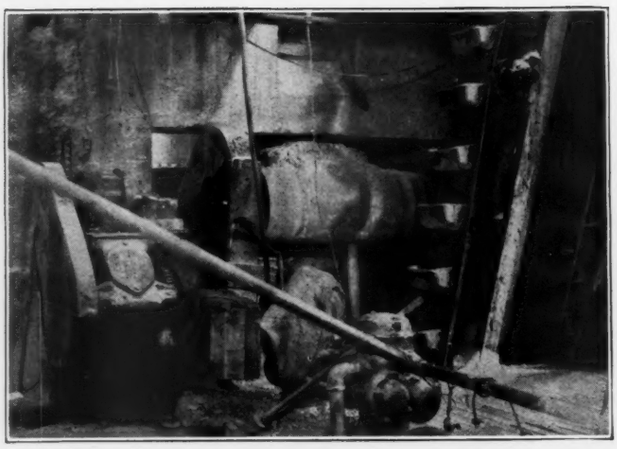
The dryer discharges to a bucket elevator feeding to two 4-ft. by 6-ft. Hum-mer single-deck vibrating screens with 10-mesh cloth. These screens



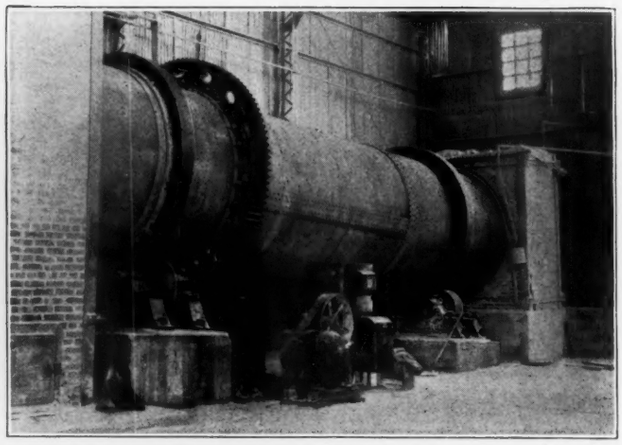
Rock from cars being dumped into crushers.



J. H. Engelage, plant foreman, and F. J. Ueltzen, superintendent.



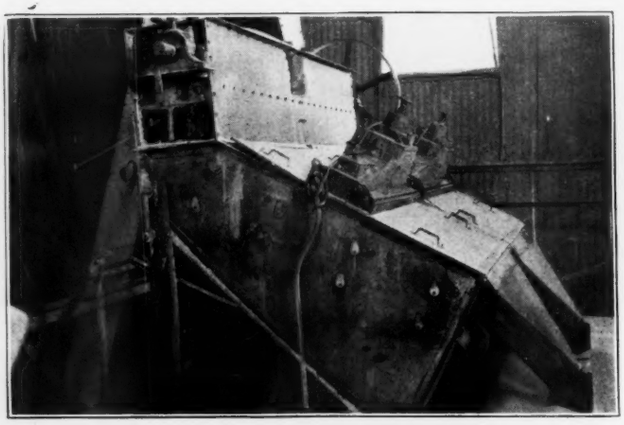
Belt conveyor feeding bucket elevator to dryer.



The 7-ft. by 35-ft. rotary dryer.

are of the enclosed type with distributing screws feeding the material to them. The oversize discharges to a 24-in. by 18-in. Type A Jeffrey swing-hammer pulverizer. The material passing through the screen goes by chutes to a 1,000-ton-capacity bin. The pulverizer discharges to a third elevator feeding a third Hum-mer 4-ft. by 6-ft. enclosed vibrating screen with 10-mesh cloth. The oversize from this screen goes back to the same pulverizer while the throughs go to another 1,000-ton bin. The two elevators feeding the screens, and the screens are all steel-enclosed and are connected with a dust-collecting unit. The fine material gathered goes to a small steel bin. The elevators are each chain-driven through Caldwell speed reducers.

The two large 1,000-ton bins are located side by side and extend from the plant to the sidetrack almost 100 ft. below. They are of steel construction with stone foundations and slope with the hill-



Two vibrating screens with worm distributor above.

Electric hoist which operates scraper.

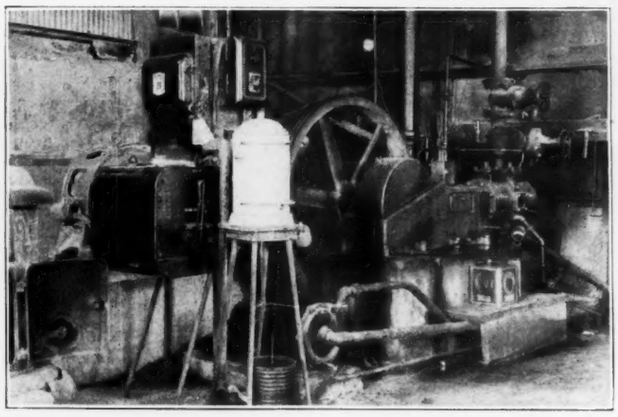
side. They discharge through vertical sliding gates and chutes into boxcars on the siding.

A compressor house alongside the plant houses a Worthington 2-cyl. air compressor which is driven through a Texrope drive by a 60-hp. West-

Scraper feeding overburden to nozzle stream.

Machine shop (left), crusher house (center), and office building (right).

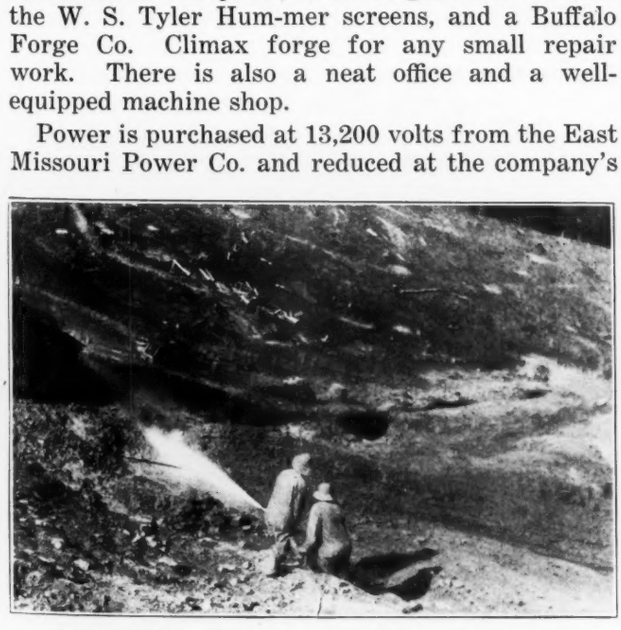
inghouse motor. A single-cylinder compressor of the same make is driven through an American high-speed chain-drive by a 50-hp. Allis-Chalmers motor. These furnish air for the drills and oil



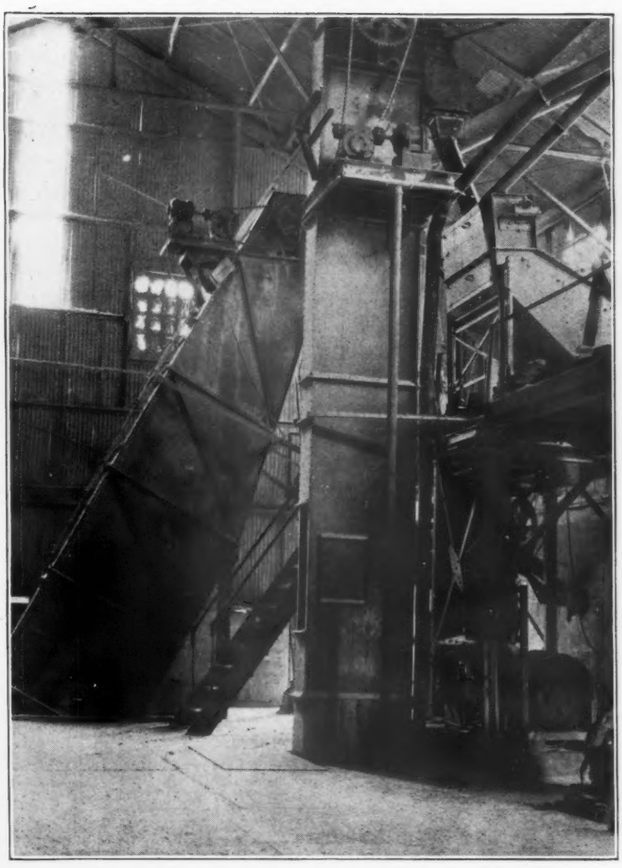
Two-drum hoist and motor.

burners. This building also houses the control switches for the plant, a motor-generator set for the W. S. Tyler Hum-mer screens, and a Buffalo Forge Co. Climax forge for any small repair work. There is also a neat office and a well-equipped machine shop.

Power is purchased at 13,200 volts from the East Missouri Power Co. and reduced at the company's



Hydraulicking overburden on hill above the quarry.



Elevators feeding vibrating screens.

own substation to 440 volts for motors and 110 volts for lights. The substation is Westinghouse equipped. Square D safety switches are used throughout the plant. All conveyors and elevators were furnished by the Link-Belt Co.

The plant has a capacity of about 125,000 tons of silica sand per year. Most of this is marketed for glass making, although some is sold for soap making, silicate of sodium, refractory brick, foundry work and for testing purposes. The Tavern Rock Sand Co. operates another plant at Millville, N. J. and is a subsidiary of the Owens-Illinois Glass Co. of Toledo, O. F. J. Ueltzen is superintendent at Klondike. Officers are A. M. Sherwood, president; Geo. P. Allen, Toledo, O., and T. A. Graham, Millville, N. J., vice-presidents.

Large Unsurfaced Mileage of Roads Shows Plenty of Work Ahead

Last year, 5,651,000 motor vehicles were produced in the United States and Canada, with a valuation of some $3,483,900,000. These, with those already in use, brought a total registration figure for the year of 26,400,000 motor vehicles, an 8 per cent gain in registration over 1928. Of the total 3,016,281 miles of highways in the United States, 660,000 miles are surfaced. The rest range from mountain trails to fairly serviceable secondary roads. These facts show plenty of work ahead for road builders.

Tamping Blocks for Well-Drill Blasting Should Be of Varied Design*

By J. W. KOSTER
Technical Representative, E. I. du Pont de Nemours & Co., Inc.

IN ALL quarries where well-drill blasting is practiced, a tamping block is a necessary part of the equipment, although it is rarely used today for the purpose for which it was first introduced. In earlier days it was the belief of many that in loading a well-drill hole both the dynamite charge and the stemming had to be tamped at frequent intervals in order to secure the best results from a blast. For this purpose a hardwood block was used, ordinarily about 4 in. in diameter and 3½ ft. long, and this was suspended on a 1-in. rope of sufficient length to reach to the bottom of the hole. Sometimes the block was heavily weighted with babbitt.

Experience has shown, however, that such tamping is ordinarily unnecessary and indeed undesirable. When the large-sized cartridges now used in well-drill blasting, up to 7 in. x 24 in., are dropped into the hole, their own weight causes them to spread and fill the hole so as to exclude air spaces and give compact loading. The sand or fine screening generally used for stemming also packs to sufficient density simply by being poured into the hole. In fact, some blasters and superintendents do not permit a tamping block to be put into the hole unless the hole becomes plugged. In this case the old cylindrical type of block is not the best tool to clear the hole and several modified shapes, designed for this use, are more effective.

At all times, clearing a hole plugged with dynamite is an operation which must be handled with care, and with a full understanding of the danger involved. Compression of a thin film of dynamite between the tamping block and the walls of the bore hole, and friction against such a film, may start a premature explosion and therefore the tool used to break through the dynamite bridge should be of such a shape as to avoid this hazard. Fig. 1 shows a very effective tool for clearing plugged holes. It has been used for a number of years in the quarries of the John T. Dyer Co. near Birdsboro, Pa. The reduced and pointed-bottom section, 1½ in. in diameter and 3 ft. long, will punch through the clogged dynamite rather than drive it down by compression, while the shape and length of the upper section tends to force the point to strike near the center of the dynamite rather than against the side walls. Incidentally, a block of this shape is not so likely to damage the cordeau or dislodge loose rock from the sides of the hole as the ordinary cylindrical block. After a hole has been punched through the center of the dynamite plug and enlarged by churning the spike up and down a few times, the shoulder of the block is effective a clearing the hole. As an additional safeguard, in all work of this kind, water should be poured in the hole before starting to dislodge the dynamite and at intervals during the operation.

(*Continued on page* 50)

* Reprinted from *The Du Pont Explosives Service Bulletin, April,* 1930.

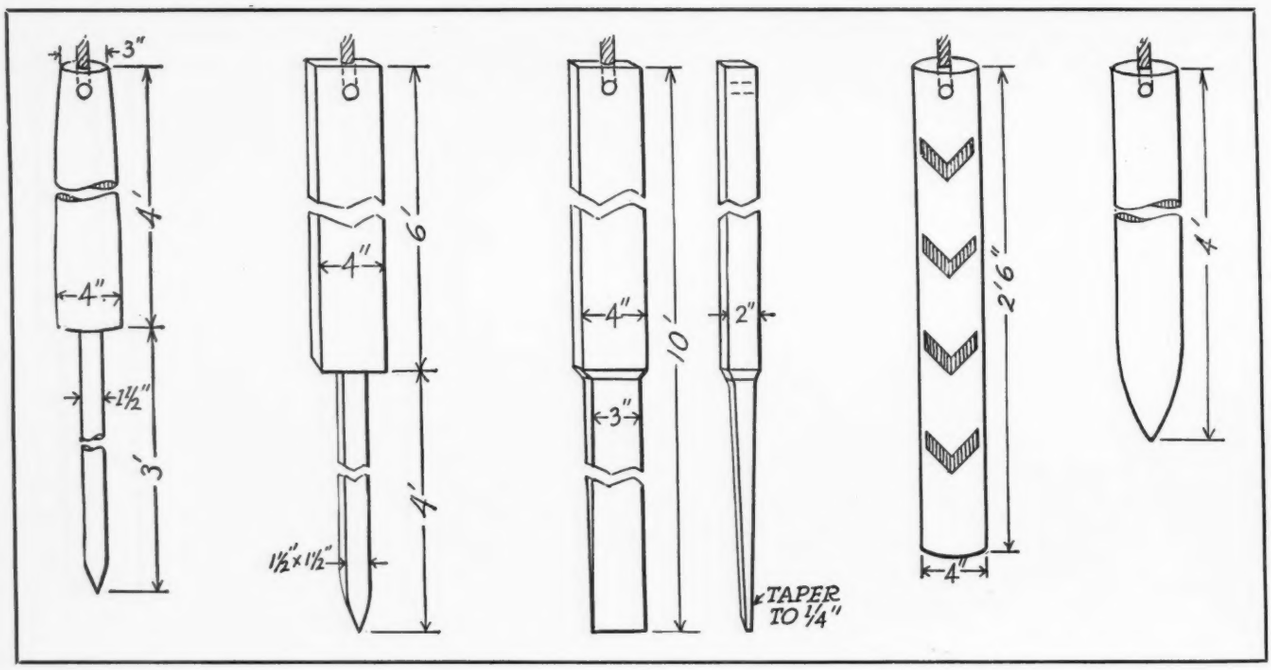


Fig. 1. Fig. 2. Fig. 3. Fig. 4. Fig. 5.

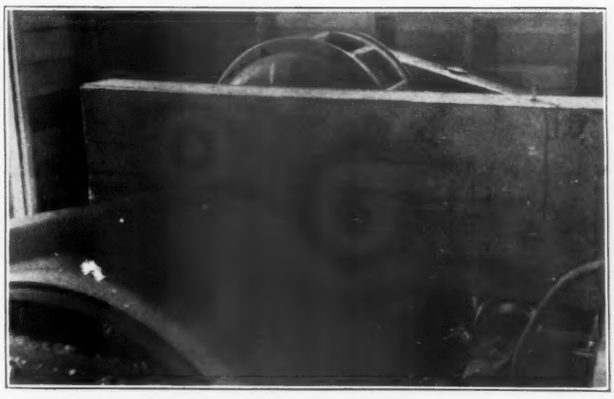
Efficient Washing and Loading Systems Features of Missouri Plant

New Operation Which Began Producing March 20 Already Working Two Shifts

By W. E. TRAUFFER

THE Missouri Gravel Co., of La Grange, Mo., on March 20 of this year put into operation one of the most up-to-date and efficient sand-and-gravel plants in that state. It has a capacity of 4,000 tons in a 16-hr. day and is of concrete and timber construction throughout. Unusual care was taken in its design to insure a clean product and to give the plan sufficient flexibility to produce any desired sizes. The plant was designed by the W. H. K. Bennett Co., Chicago, Ill.

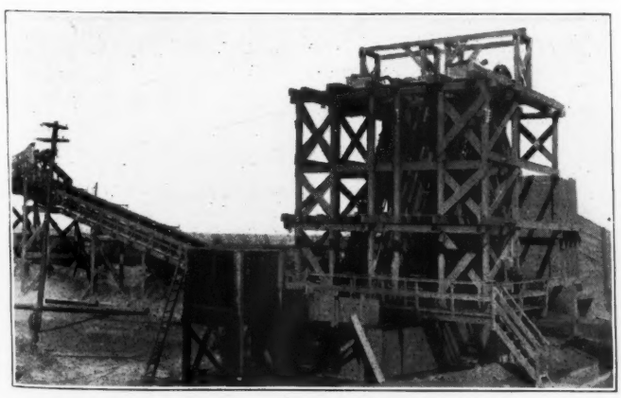
The property consists of 348 acres about 3 miles south of La Grange, Mo., 15 miles northwest of Quincy, Ill., and 2½ miles west of the Mississippi River. The gravel deposit runs from 25 to 42 ft. in depth, averaging about 30 ft. It is about 50 per cent sand and 50 per cent gravel, with only about 15 per cent of the latter requiring crushing. The overburden, which runs from 4 to 6 ft. in thickness, is caved with the other materials during dredging.



Silent-chain drive at head end of conveyor.

Two of the sand cones in operation.

The dredge, also designed and the equipment thereon furnished by the W. H. K. Bennett Co., is of the most modern type. The steel hull, which is in three longitudinal sections, is 97 ft. long and 30 ft. wide. Each section is divided into two watertight compartments and the center section is 10 ft. shorter than the other two, forming a shallow well for the dredge ladder and intake. The superstructure is of wood.



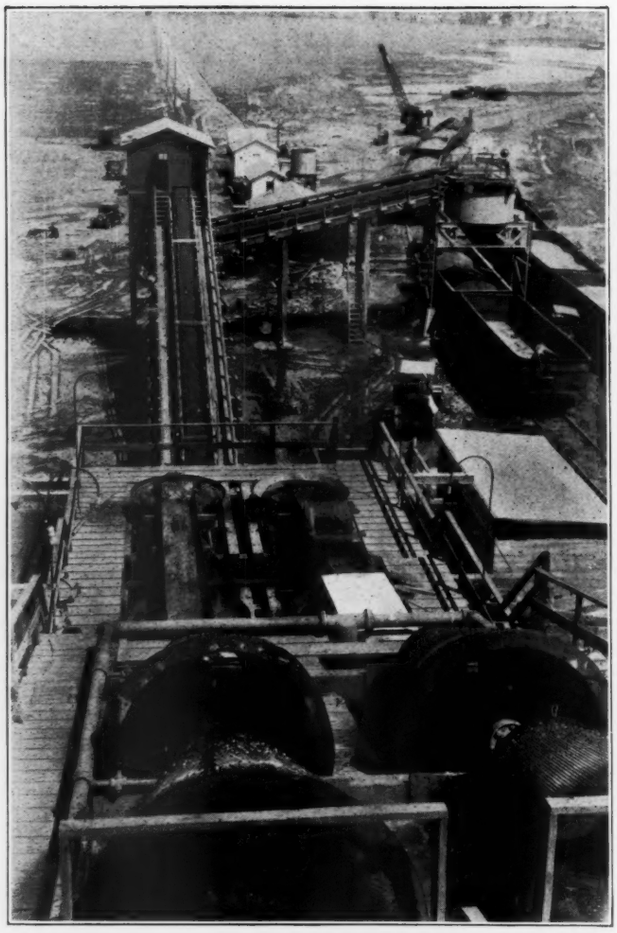
Dredge pipe discharge box (center), elevators from dewatering boxes (right center).

The 35-ft. Diamond ladder-type cutter head is supported on the dredge at the top end, and at the intake end from a structural steel frame supported on two steel pontoons. These are attached to the dredge hull by swivel connections, preventing most of the vibration and jarring when digging in coarse material from being transmitted to the dredge. The cutter-head is driven by a 25-hp. motor. Cincinnati Rubber Co. suction hose is used.

A Clyde 3-drum hoist, driven through a Link-Belt silent-chain drive by a 15-hp. motor, operates two head-lines to the shore and the line raising and lowering the dredge intake and ladder. Weller Mfg. Co. sheaves and Leschen cable are used.

The 12-in. Diamond centrifugal dredge-pump is of the manganese steel, side-intake, bottom-discharge type and is driven through a flexible coupling by an Allis-Chalmers 300-hp. variable-speed induction motor. This pump is primed by a Chicago Pump Co. 3-in. centrifugal pump, driven by a 15-hp. motor which, in turn, is primed by a small barrel above and kept filled with water. A Ford Tribloc 3-ton chain hoist over the dredge-pump handles any parts for replacement.

The intake pipe is straight but as the dredge has a rear discharge there is a bend in the discharge line. A foot-valve past this bend keeps water and

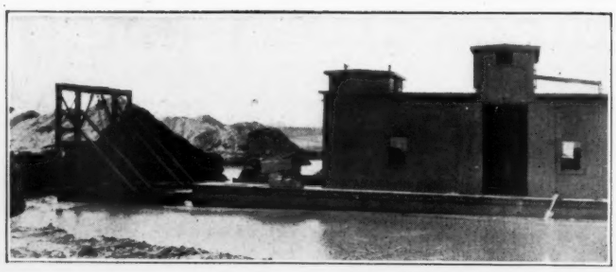


Looking down on plant from the screening building.

gravel from backing into the pump in case of a shutdown. The pipe-line, which is now about 200 ft. long, is carried on steel-barrel pontoons. The pipe sections are connected by Cincinnati Rubber Co., Pacemaker dredge sleeves fastened by Black Bros. Co. chain couplings and sleeve fasteners.

Power is transmitted to the dredge at 2,200 volts for the pump motor. This is reduced to 440 volts for the other motors. The transformers and the resistance coils for the variable-speed dredge-pump

Gates discharging to belt conveyor in loading tunnel.

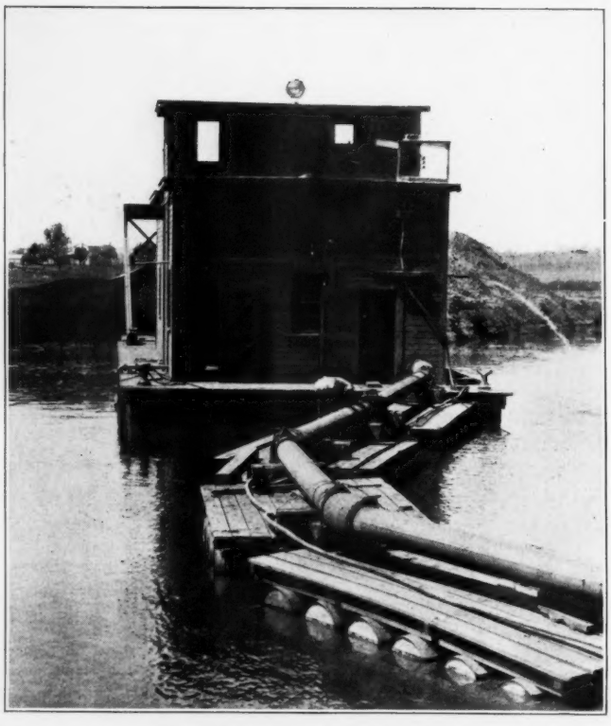


Side view of the dredge.

motor are located in a little house above the dredge. The operator has a room in the front of the dredge from which he can watch the operations. All of the controls for the hoist, cutter-head, pump, and other units are so located that he can operate them without leaving his seat.

The shore end of the dredge line discharges vertically upward into a square steel-lined wooden box at the plant. This, in turn, discharges through a split chute into two steel dewatering tanks which also serve to waste some of the excess fine sand. The water overflows into a concrete flume which discharges back into a worked-out section of the pit.

Two Link-Belt dewatering elevators take the material from the boxes and discharge through two

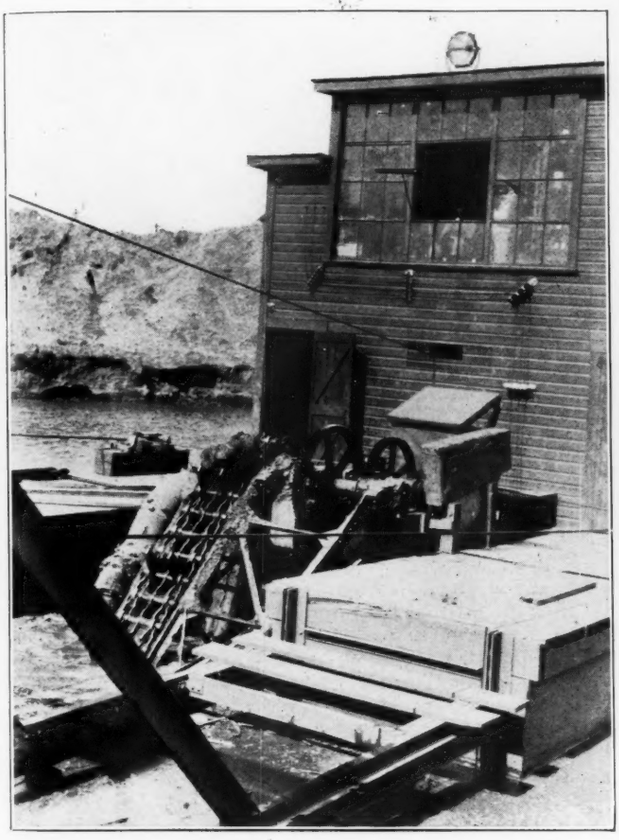


Discharge end of the dredge.

rail-lined chutes into a concrete hopper 40 ft. long by 8 ft. wide and 10 ft. deep. The elevators have 30-in. buckets, 14 in. deep, with manganese-steel tips and perforated backs to allow drainage of the water. The elevators are inclined on 36-ft. centers and operate over three pulleys. In addition to the tail and head pulleys there is a third pulley at the bottom which serves to take up any slack in the

elevator. Each elevator is gear-driven at the head pulley by a 25-hp. motor through a Link-Belt silent-chain drive.

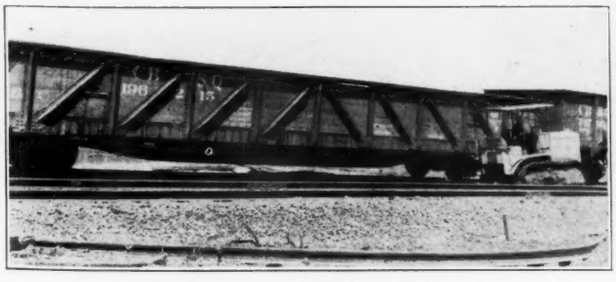
The concrete hopper discharges through two Link-Belt segmental gates onto a 30-in. inclined belt conveyor on 249-ft. centers to the screening plant. This discharges through a split chute to two rows of four Link-Belt Dull conical screens



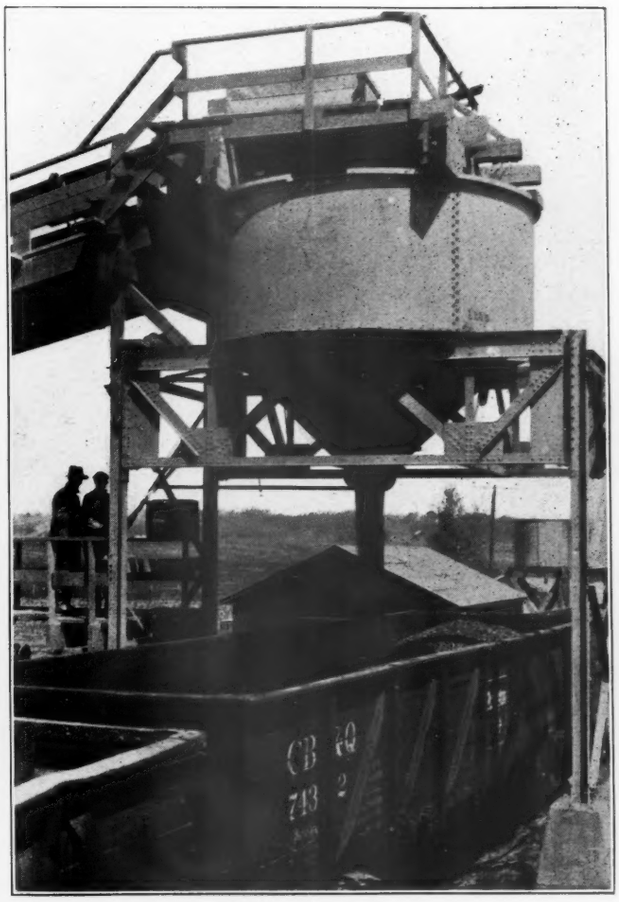
Cutter head bringing up mass of compact clay.

each. These have 2-in., 1-in., ⅝-in., and 5/16-in. perforations and produce 5 sizes. Three of these grades go directly to bins. The material under 5/16-in. is chuted to four Woods Mfg. Co., cone sand classifiers. The first two cones produce mason's and plaster sand and the second pair concrete sand.

The material over 2-in. is chuted to a wooden bin. This can, as desired, overflow into a waste pile or feed through a Link-Belt segmental gate to an Allis-Chalmers 6-in. Superior McCully gyratory reduction crusher. This is belt-driven by a 50-hp.



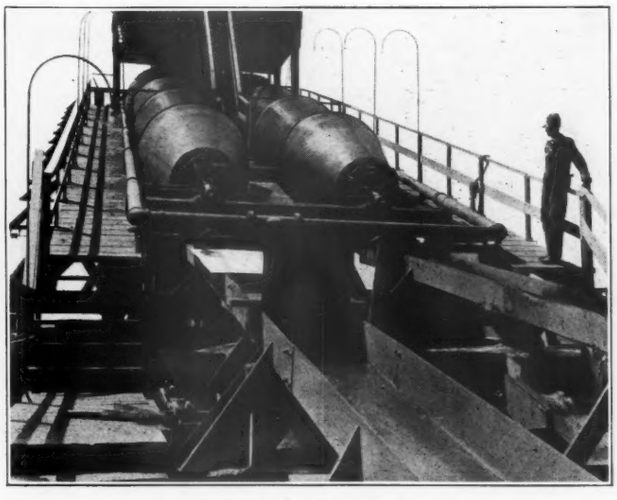
Spotting cars with cable and tractor.



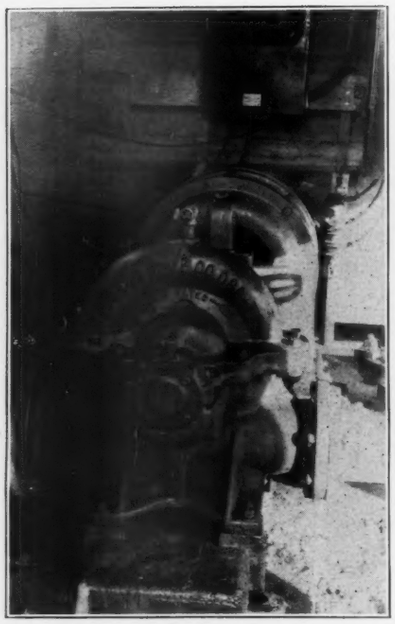
Circular steel bin discharging into car.

motor housed in a small wood and concrete house. The drive belt is also enclosed in a wooden housing. The crusher discharges onto a 20-in. inclined belt conveyor which returns the crushed gravel onto the main conveyor leading to the screening plant. The main conveyor is driven by a 30-hp. motor, and each of the two rows of screens by a 15-hp. motor, all through Link-Belt silent-chain drives.

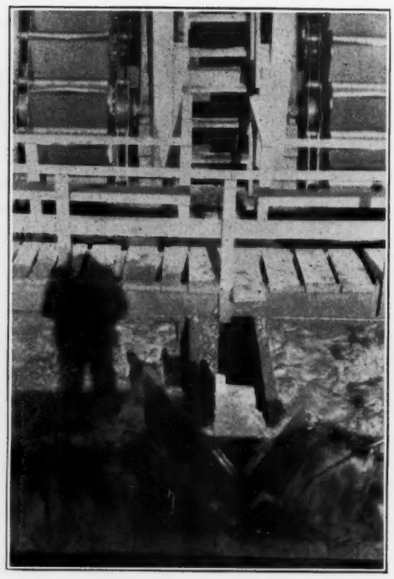
The six bins are of the open-end type which has been rapidly coming into favor in the past few years. They have a total capacity of about 2,500



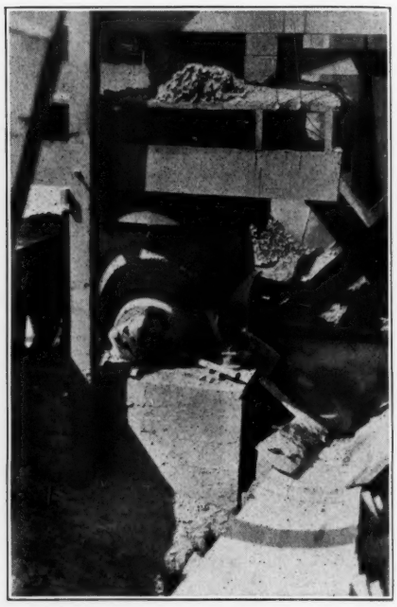
View of the screening plant.



Centrifugal pump which supplies washing water.



View of the dewatering boxes in operation.

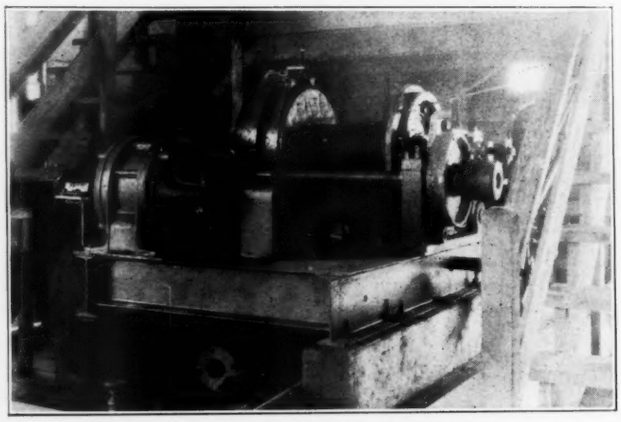


Gyratory crusher which discharges to return conveyor.

tons. The partitions between the bins, like the remainder of the plant and the conveyor inclines, are of timber but are braced with structural steel.

About 50 per cent of the stored material can be recovered through a concrete tunnel which runs beneath the bins. This tunnel is 8 ft. square and 100 ft. long. Twelve Link-Belt segmental gates, two under each bin, discharge onto a 30-in. belt conveyor on 219-ft. centers which carries the material horizontally under the bins and then up an incline to a transfer house. Here it discharges through a chute onto a 30-in. inclined belt conveyor on 50-ft. centers at right angles to the plant. This feeds to a Blaw-Knox 35-cu.yd.-capacity circular steel bin which discharges through a clamshell gate into railroad cars on the loading track below. The tunnel conveyor is driven by a 30-hp. motor through a Link-Belt silent-chain drive, and the loading conveyor by a 15-hp. motor through gears. The tunnel conveyor system allows any size or mixture desired to be produced at a moment's notice.

The cars are spotted under the loading bin by a Caterpillar 20 tractor which also does all switching on the plant tracks. The combination of loading hopper and tractor is considered a great advantage by C. D. Harvey, general superintendent. The hopper allows cars to be moved without stopping operations and the tractor moves the cars quickly—a great advantage during rush seasons. The tractor is also used for general utility about the plant.



Hoist which operates shore lines and ladder on dredge.

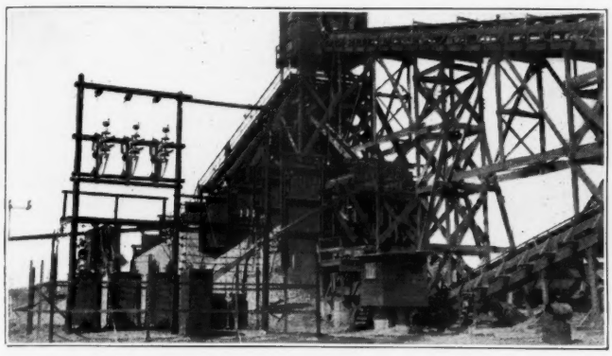
Dredge pump and 300-hp. motor.

A Link-Belt type 47 full-revolving crawler crane handling a 1-cu. yd. Kiesler clamshell bucket is used for stockpiling and rehandling material. Cars of material are weighed on a track scale installed by the railroad near the plant. An old Holt 10-ton caterpillar tractor is used for general utility.

The capacity of the plant, 4,000 tons per day, is handled with ease by the 12-in. dredge pump because of the short radius of operation at present and the low head, less than 20 ft., against which it is working. When the pit is enlarged and the distance the material is pumped becomes greater, another dredge now on the property also will be

used. This is a 10-in. dredge similar to the new one now in use with the exception that it has a wooden hull. It also is comparatively new, it having been built in 1929 by a company which formerly operated a small plant on the property now owned by the Missouri Gravel Co. This old plant will later be torn down.

Washing water for the plant is furnished by a Chicago Pump Co. 6-in. centrifugal pump located in a woden-frame pump-house on the edge of an abandoned pit. This is direct-driven by a 75-hp. motor through a flexible coupling and is controlled by a Square D safety switch and a General Electric starting compensator. The pump has a 10-in. intake and a 10-in. discharge line, both reductions being made with Clow reducers. Crane Co. check and gate valves and Taylor spiral pipe are used. A Ford Tribloc chain hoist handles the intake pipe.



Electric substation (left) below screening building.

A small 2-in. centrifugal pump of the same make, driven by a 5-hp. electric motor, supplies water for washing cars.

Power is purchased from the Northeastern Missouri Light & Power Co., at 33,000 volts. A Westinghouse outdoor substation at the plant reduces to 2,200 volts for the dredge motor, 440 volts for all other motors and 110 volts for lighting. The entire plant and the dredge are wired for night operation. In addition to electric lights in all buildings and along all conveyors there are numerous floodlights at suitable points. These are mostly General Electric Novalux projectors with a few Westinghouse Chromilites.

The belt conveyor idlers, pulleys and drives, conical screens, bucket elevators, and bin gates were all furnished by the Link-Belt Co. Diamond Rubber Co. Tripper conveyor belting is used. The two main conveyors have vertical gravity takeups. With the exception of the dredge-pump motor, all electric motors were furnished by the General Electric Co., which also furnished most of the electrical equipment. Square D safety switches and Leschen cable are used throughout.

General Superintendent C. D. Harvey and dredge operator.

The plant is well situated for shipments in any direction and has a large sales territory. A switch track connects it with the main line of the C. B. & Q. Ry., between St. Louis and Minneapolis. Connections allow shipments to be made as far as Burlington, Ia., 130 miles north; Macomb, Ill., 130 miles east; and Brookfield, Mo., 150 miles west. Shipments south are rarely to any great distance as the company has another plant at Louisiana, Mo.,

Open-end bins below the conical screens.

Conveyor from tunnel to transfer house and to bin.

Clamshell crane rehandling material to cars.

about 60 miles south of La Grange. Most of the material sold is for road work, Missouri, Illinois and Iowa all having huge highway programs under way.

An inspector's laboratory is maintained near the plant. Two state inspectors from Missouri, and one each from Iowa and Illinois are always on duty. Other miscellaneous buildings include the plant office and machine and blacksmith shops which, as yet, are not fully equipped.

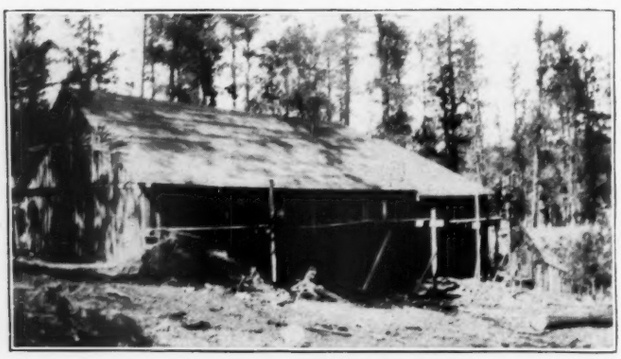
The Missouri Gravel Co. is a subsidiary of the Moline Consumers Co., of Moline, Ill. In addition to the new plant and the plant at Louisiana, Mo., it operates a smaller plant on the Mississippi River about one-half mile southwest of La Grange. C. D. Harvey is general superintendent of the three plants, and Victor Nelson is superintendent of the new plant.

Officers of the Missouri Gravel Co. are: James P. Pearson, president; Charles C. Loptien, secretary, and Oscar W. Ellis, treasurer.

Mica Deposit in Black Hills Region Being Developed by New Firm

A new company known as the U. S. Mica Mfg. Co., is developing a property in the Black Hills region, S. D. Sigurd Olsen, Forest Park, Ill., is president, and Col. L. S. Powers, Custer, S. D., vice-president and general manager of the concern.

The mica, of ruby color, occurs disseminated throughout a great mass of feldspar, itself an attractive resource. Col. Powers states that he expects to mine material that will average about 80 per cent book or sheet mica and 20 per cent scrap mica. He proposes to mine about one carload of feldspar daily and two carloads of mica weekly.



Mine house, U. S. Mica Manufacturing Co.

The deposit contains also beryl, spodumene and amblygonite, all of which might be commercialized with proper milling equipment. Although beryl is regarded as a gemstone (emerald is the deep-green, transparent beryl), the crude mineral is coming into demand as the ore from which beryllium is derived for use in building frames of airships.

The present equipment includes a Lidgerwood hoist, a Venn-Severin oil engine driving an International compressor and Ingersoll-Rand Jackhammers.

Asbestos Output Last Year Shows Increase Over 1928

The total quantity of asbestos sold or used by producers in the United States in 1929 was 3,155 short tons, valued at $351,004, according to figures compiled by the United States Bureau of Mines, Department of Commerce, from individual reports furnished by producers. These figures represent 1,983 short tons of chrysotile, valued at $317,584, mined in Arizona and Vermont, and 1,172 tons of amphibole, valued at $33,420, mined in Georgia, Maryland, Montana, and North Carolina. As compared with 1928, figures for chrysotile showed an increase in quantity, but a decrease in value, while amphibole showed increases in both quantity and value.

Figures for chrysotile include both crude and mill fiber, and therefore represent a combination of high-grade and low-grade fiber. Amphibole is also produced as long and short fiber. To avoid disclosing confidential returns, the figures showing the high-grade long fiber from Maryland, used since 1918 for making chemical filters, have been combined with those showing mass and short fiber anthophyllite (amphibole) produced in Georgia, Montana, and North Carolina.

In Arizona the average values for total crude asbestos (Nos. 1, 2, and 3) was about $300; ranging from $450 to $600 a ton for No. 1; from $225 to $500 a ton for No. 2; and from $75 to $275 a ton for No. 3. The average value for all mill fiber asbestos sold in Arizona (Nos. 1, 2, and 3) was $171.

Production was reported from Vermont for the first time since 1922, when experimental operations were carried on by the Asbestos Corp. of America. In 1923 activities were suspended at the property, which is in Lamoille County, near Hyde Park. Since that time the company has been reorganized under the name of the Vermont Asbestos Corp., operations resumed, and a total of 1,049 tons of mill fiber asbestos, valued at $47,799, reported for 1929.

The figures on asbestos sold or used by producers in Georgia, Maryland, and North Carolina were collected in cooperation with the state geological surveys.

Imports of unmanufactured asbestos for consumption amounted in 1929 to 262,427 short tons, valued at $11,153,017, divided as follows: crude, 16,976 tons; mill fiber, 95,384 tons; refuse, 150,067 tons. Corresponding total figures for 1928 were 230,595 short tons, valued at $9,017,891.

Sand and Gravel Association Directors Pick St. Louis for 1931 Meet

Credit Bureaus, Trade-Practice Conference Proposed at Midyear Meeting in Milwaukee

A PROPOSED trade-practice conference of the sand-and-gravel industry, the difficulties encountered in the settlement of bond claims, and the possibility of stabilizing the credit situation through the establishment of credit bureaus were among the important questions that held the attention of the directors of the National Sand and Gravel Association during their recent two-day session in Milwaukee. The board gathered for its regular semi-annual meeting on May 14 and 15 at the Schroeder Hotel.

President Robert J. Potts presided at all sessions and conducted the proceedings with his characteristic spirit and dispatch. After opening the first morning's session and welcoming four former presidents—Alex. Dann, R. C. Fletcher, Hugh Haddow, and V. O. Johnston—who were present, he lost no time in focusing the board's attention on the question of the 1931 convention. Representatives from various cities—Chicago, Pittsburgh, St. Louis and West Baden—were heard, and the sentiment of the members favoring Pittsburgh and St. Louis was finally crystallized by an afternoon vote which disclosed St. Louis as the board's choice. The Jefferson Hotel was selected as headquarters and January 27, 28 and 29 as the dates.

Most of the first morning session was occupied by the plea of Alan Parrish, of the Associated General Contractors of America, for the formation of credit-information bureaus to be operated by aggregate producers in conjunction with local contractors. Mr. Parrish reported on the operation of such bureaus in his own state, Illinois, and described their work as successful. Producers and contractors in New York, Iowa, Pennsylvania, Minnesota, Texas, and Tennessee, he said, are considering the bureau idea and the chances for its adoption seem good.

Raps Indiscriminate Credit

Describing the present market as a "giver's market" rather than as a buyer's or seller's market. Mr. Parrish said that producers and contractors are contributing to the disruption of healthy trade conditions, the former through the indiscriminate granting of credit to contractors, and the latter through overdevelopment of their facilities on the strength of credit supplied by the material dealers. Reputable contractors, he said, maintain their credit reputation and confine their borrowing to their banking connections, and it is contractors of this type who are primarily interested in the formation of credit bureaus.

The agreement in effect between Illinois producers and contractors describes the purpose and organization of the credit bureau in the following words:

"The power of purchase, exercised either individually or through group action, is recognized as a very dominant factor in modern industry. Contractors possibly have been aware of this latent power which exists within their ranks but have hesitated to take any group action toward it.

"It has been approved by the Federal Trade Commission that this group action is entirely within their rights and can be exercised in one of two directions. It may be advanced either through the power of purchase or by the laying down of principles under which they will make their purchases.

"The former, power of purchase, while it might act as a financial benefit to those interested, would not tend to correct the evils which exist in our industry. Therefore, the banding together or grouping of contractors and the laying down of ethical or trade practices which they will demand in their purchase of all materials can easily be made a requirement of the material companies on sales other than those to the group taking such action. This action should consist in the adoption of standard credit terms and the development of fair trade practices under the guidance and counsel of the Federal Trade Commission. It is understood that the aim and intent of this action is to eliminate the over-extension of credit and the promulgation of credit terms which are not for the good of the industry nor recommended by this group.

"Therefore, it is recommended by the contractor group that all material should be sold upon a cash-discount basis, namely, that for all material shipped in any one month there shall be granted a substantial cash discount for payment on or before the 15th of the following month. Such account shall automatically become due on the 1st of the following month. If payment is not made at that time the said contractor is automatically put on a cash basis.

"As a guarantee of performance of the above suggestion a credit bureau is to be formed and placed in the hands of an executive chosen by a committee consisting of equal representation from the three groups. This committee, composed of representatives of the contractors' group, the stone group and the sand-and-gravel group, shall act as an approving body in directing the affairs of the bureau so that proper performance of the above recommendations will be assured.

"In order to promote confidence and effect a general understanding a uniform system of accounting should be established. The action on an account should follow this routine: As of the 1st of the month for all material shipped in the preceding month a duplicate invoice shall be rendered by the producer to both the consumer and the committee or bureau; as of postmark of the 15th of the following month a check for the gross amount of the above invoice should be in the hands of said bureau or committee and, if proper in all details, shall be marked approved for discount and immediately forwarded to the producer. Said producer upon receipt of this check will immediately issue a check for the cash discount in the name of the consumer and will mail it back through the channels of the bureau or committee, where such transaction will be closed and a check forwarded immediately to the consumer. If settlement for such account is not made in the gross amount by the 1st of the following month, postmark to govern, said bureau

shall immediately ascertain from both producer and consumer the status of such account, and, if payment has not been made, such consumer shall be placed upon the cash-in-hand basis, and all producers who are a party to this premise shall upon request be advised, but said producer should immediately take proper legal steps to protect his delinquent account.

"Upon the notification of charges by any producer or contractor of a violation of such terms by either producer or contractor said bureau shall have the right to have a certified public accountant investigate the books of either party or both parties to determine the veracity of such charges. It is recommended that, as of the 1st of each month, each producer or contractor ask for this or any other information in the possession of the bureau which might be of value to him.

"It is suggested that this cash discount for payment on or before the 15th of the month should be 10c per ton. It is also agreed that the producer at the time of settlement of monthly accounts shall immediately return to the bureau a check for 5c per ton for all business concerned, and that the funds so created shall be used to defray the expenses of the operation of the bureau, and that the balance of said created funds shall become the joint property of the industry, to be used for promotional, educational, legislative and any other necessary expense which shall be approved by the joint committee from the sand-and-gravel, stone and contracting industries.

"These terms and the application thereof shall be applicable to what is known as all specification work within the State of Illinois, including state work and county work under state supervision, with the exception of improvements within the confines of Cook County. It is not the intention to cover other types than hard surface pavement or concrete structures.

"It is further suggested that an arbitration committee composed of engineers representing each of the three groups, the contractors' group, the sand-and-gravel group and the stone group, shall at some future time determine the comparative weights of different aggregates and that their findings shall be used as the basis of quotation for this work.

"There shall also be created an enlargement of this bureau committee, which shall consist of equal representation of the three groups concerned and which shall act as a grievance or arbitration committee when matters are properly brought to its attention.

"Membership in these three groups, namely, the contractors' group, the sand-and-gravel group, and the stone group, shall be left open so that any individual or firm agreeing and so subscribing to the agreement may become a member."

According to J. L. Shiely, a similar arrangement, adopted by producers and contractors in Minneapolis and St. Paul, has produced the desired results and has bettered the situation which formerly existed. He admitted, however, that the idea had not at first appealed to him and that he had accepted it with misgivings. A satisfactory development of the same method in Memphis, Tenn., was reported by V. A. Cordes. H. N. Battjes, of Grand Rapids, Mich., said that, by demanding cash from contractors whose accounts were 60 days in arrears, his local bureau had greatly improved trading conditions, but that, in his opinion, a new code of business ethics would be a desirable addition to the work of the credit bureau. After hearing these comments from members who had seen the credit-bureau system in operation, the board passed the following resolution:

"Resolved, That the Board of Directors expresses its approval of co-operation between the producers of concrete aggregates for the purpose of interchange of credit information, and the President is authorized to appoint a committee of three members in order to investigate the various plans proposed for organization of credit bureaus and to submit or report to the membership at the next annual convention with respect to their findings."

This was the only official action taken by the board on this question.

At the close of the forenoon session the directors and others in attendance were the guests of the Harnischfeger Corp., which provided luncheon and then escorted the visitors through its plant.

Progress on Standards

The afternoon session was opened by Stanton Walker, director of the Engineering and Research Division of the association. He reported steady progress by the Committee on Standard Specifications for sand and gravel and that a vote on its recommendations had been received from 40 per cent of the membership and that 60 of the requisite 80 per cent tonnage was represented by the members who had voted.

Mr. Walker referred to the statement of the secretary of the Empire State Sand and Gravel Association, John G. Carpenter, who said that there is no need for six sizes of gravel, and explained that the six sizes recommended by the national association had been offered as substitutes for the many sizes now being made and that it was not supposed that all six sizes would be made by any single producer or that any producer would make more sizes than his market required. A reduction and not an increase in the number of sizes was the committee's object, Mr. Walker said. As Mr. Carpenter had advocated only three sizes and had notified the membership of his stand in the matter, several members had been in doubt and had written to the committee for information. Mr. Walker's explanation was intended to remove any misunderstanding that might have resulted.

That a close study of cost systems, based on the knowledge that prices are founded on costs, and a revision of existing bookkeeping methods are badly needed by the sand-and-gravel industry were the conclusions of the Committee on Uniform Cost Accounting as reported by its chairman, H. H. Stewart. While simplicity is, in the committee's opinion, the chief end to be sought, a degree of flexibility, which will allow the use of a detailed cost-keeping system when desired, is held to be of great importance. The methods employed should provide similar schemes for classifying costs and for handling the same items of cost.

The extent to which sand-and-gravel producers use cost systems is shown by the results of a questionnaire poll, which disclosed that, of the producers who reported, 48 keep detailed cost records, 5 partial records, and 8 no records. Fifty-six favor the adoption of a uniform system, while two do not. From a study of the 78 replies sent in by those who replied it was evident that only through a classification of operations could a satisfactory cost-keeping scheme be developed. The cost-system manuals of the cement and laundry industries were studied by the committee, in

view of the suggestion of J. R. Thoenen, of the U. S. Bureau of Mines, that the association should prepare a manual for its members' use, but both were thought to involve complications and a mass of detail that were not needed in sand-and-gravel cost-keeping. The committee expects to have more information after its next meeting to be held in July.

Safety Co-operation Urged

V. O. Johnston, in reporting on the work of the Safety Committee, drew attention to the importance of humanitarian considerations in safety work, yet emphasized the necessity for recognizing the increased efficiency which results from accident-prevention work and its effect on compensation-insurance rates. He urged all members to send rate information to the association's Washington office, where it can be attentively studied. In order to acknowledge meritorious accident-prevention work which, while significant, falls short of winning the trophy, the committee suggested the award of certificates of merit. Although only 26 plants entered the 1929 contest, the entries for this year already include 77 plants. This increase is due largely to the increased interest in accident-prevention work that has resulted from the safety activities of the association and the Bureau of Mines.

Gravel ballast is in good standing among railways, Mr. Walker pointed out in reviewing the work of the Committee on Gravel Ballast. The specification which has been tentatively adopted limits the size of the top material to 1½ in. and fixes a No. 10-screen limit for the bottom material. An increase of the top-material limit to 2 in. has been asked for by producers who prefer not to make a size that differs so much from that usually required for making concrete.

With reference to the proposed holding of a trade-practice conference, Hugh Haddow, chairman of the committee appointed to consider the matter, reported that the committee deemed it advisable to hold such a conference during the coming St. Louis convention.

Those attending the board meeting were invited by J. C. Buckbee, one of the directors, to be his dinner guests at the Milwaukee Athletic Club the evening of the first day. In thanking them for their presence he spoke of the sand-and-gravel industry's need for publicity among the public. Whereas the average man was reasonably well-informed about other industries, owing to their active campaigns of propaganda in their behalf, he knew little, if anything, about the industry supplying sand and gravel, said Mr. Buckbee. In his opinion, it must receive wider recognition as an important factor in the industrial fabric of the nation, and sand and gravel must be publicly thought of as manufactured products and not as "something dug out of a bank." Technical knowledge and efficient production methods are important factors in the industry and should be so recognized by the public at large.

At the morning session of the second day Mr. Ahearn reminded his hearers of the change in the status of the sand-and-gravel industry wrought by the census bureau's decision to collect production, wage, and other data for that industry separately. The bureau had classified the industry with the mining group, but was developing, in co-operation with the association, a special questionnaire which will be mailed to all producers. The original request for information will be followed up, if necessary, by the call of a field enumerator, Mr. Thoenen of the Bureau of Mines explained.

Mr. Thoenen has been appointed the head of a new division of the Bureau of Mines. This new section will investigate and report on non-metallic mineral operations only, making a special study of operating data and production costs. Operators have been asked to prepare papers on special subjects, and these will be read at the coming convention.

The work of the Engineering and Research Division of the association was briefly reported on by Stanton Walker, director of the division. He referred to the field work carried on in visiting Chicago, Philadelphia, Memphis, Cleveland, and other cities to attend various association meetings, to assist in the revision of the Illinois highway specifications, and to observe the construction of an experimental road to be built with gravel, stone, and slag as the coarse aggregates. On the subject of highway specifications, Charles Stokes, one of the guests, said that, in his opinion, strength would soon be the only specification given for concrete. The contractor, under such a plan would determine his own design of mix and the materials entering it and would be made to comply with the strength requirements only. Mr. Stokes is engineer of the Materials Division of the Wisconsin Highway Department.

While mentioning the publications which the association will publish in permanent form, Mr. Walker said that the work of his division had shown that the size, gradation and other limits now placed on materials might be raised to 1½ in. or 1¾ in. Except for unusual cases, the use of larger sizes is not advisable, he thinks.

Mr. Walker said that his investigations had shown that angular shape does not affect the compressive or flexural strength of concrete when the materials are combined in the proper proportions. His division is studying the results that follow the use of fine particles in 50- to 100-mesh sand, because some engineers believe that many specifications are too low in their size requirements.

Gravel in bituminous construction, the fire-resistant qualities of concrete embodying quartz aggregates, and methods for preventing segregation in aggregates are also being investigated. The use of separated sizes is becoming common, and is recommended and may soon be required by the U. S. Bureau of Public Roads.

D. D. McGuire is now working as association district engineer at St. Louis, and Baxter Smith, for-

merly of the Bureau of Public Roads, has been added to Mr. Walker's testing-laboratory staff at headquarters.

Alexander W. Dann spoke of the troubles experienced by producers in the Pittsburgh district in getting settlement of their claims against surety companies, which refuse payment in some cases where contractors have failed to complete their contracts as agreed. H. E. West said that he had had no difficulty in his city (Muskogee, Okla.) and had not heard of any cases such as those mentioned by Mr. Dann. Mr. Ahearn urged upon those present the necessity of reporting to association headquarters specific instances to support the association in its work with the Surety Division of the Associated General Contractors of America.

Alexander Foster, in reporting on the work of the Committee on the Organization of the Ready-Mixed Concrete Industry, said that considerable interest had been shown by ready-mixed concrete producers and machinery manufacturers in the proposal for organizing a trade association.

Mr. Ahearn then announced the appointment of R. C. Starr as assistant executive secretary and assistant editor of the association's *Bulletin*.

Car Problems Discussed

J. C. Buckbee, in speaking of his investigation of the car-cleaning and car-repairing problem, asked those present to assist him in his work by writing to the regional boards of the American Railway Association. He voiced his approval of a new type of gondola car installed by the Chicago & North Western Railway. This form of car has a solid 3-in. plank bottom supported by a steel underframe. Unloading with a bucket does no damage to the floor. The car can carry 80 tons, although its capacity is rated at 140,000 lb. He said that the tendency in selecting sand-and-gravel cars is toward the hopper type and away from the drop-bottom type. As surplus equipment is now available, the railways should remodel their old cars, he said.

President Potts appointed a membership committee of five former presidents—Messrs. Dann, Fletcher, Haddow, Johnston and John Prince.

J. L. Shiely told his fellow directors of the invitation he had received from the U. S. S. R. government to go to Russia as a consulting expert on the construction of railroad-ballast plants. His company has designed, built and operated eight ballast plants for the Great Northern Railroad, and Mr. Shiely will do similar work for the Russian government along 10,000 miles of railway in the territory extending from Moscow to Vladivostock.

The following officers, executive-committee members, and directors were among those in attendance:

Robert J. Potts, Potts-Moore Gravel Co., Waco, Tex., president and director.

H. V. Owens, Eastern Rock Products, Inc., Utica, N. Y., vice-president and member of executive committee.

H. S. Davison, J. K. Davison & Bro., Pittsburgh, Pa., secretary-treasurer and member of executive committee.

H. N. Battjes, Grand Rapids Gravel Co., member of executive committee and director.

J. C. Buckbee, Northern Gravel Co., West Bend, Wis., member of executive committee and director.

Alexander Foster, Jr., Warner Co., Philadelphia, Pa., member of executive committee and director.

F. W. Peck, Peck-Thompson Sand Co., Kansas City, Mo., member of executive committee and director.

V. A. Cordes, Wolf River Sand & Gravel Co., Memphis, Tenn., director.

Alex. W. Dann, Keystone Sand & Supply Co., Pittsburgh, Pa., director.

H. M. Davison, Harnischfeger Sales Corp., Milwaukee, Wis., director.

R. C. Fletcher, Flint Crushed Gravel Co., Des Moines, Ia., director.

M. B. Garber, Thew Shovel Co., Lorain, O., director.

W. H. Gemmer, Texas Construction Material Co., Houston, Tex., director.

Hugh Haddow, Jr., Menantico Sand & Gravel Co., Millville, N. J., director.

V. O. Johnston, Lincoln Sand & Gravel Co., Lincoln, Ill., director.

J. L. Shiely, J. L. Shiely Co., St. Paul, Minn., director.

H. E. West, West Sand Co., Muskogee, Okla., director.

Others present included:

V. P. Ahearn, executive secretary, National Sand & Gravel Association, Washington, D. C.

Stanton Walker, director, Engineering & Research Division, National Sand & Gravel Association, Washington, D. C.

A. S. T. M. Committee C-9 Considers Eighty-one Projects

The development of A. S. T. M. specifications and information on which to base specifications for concrete and concrete aggregates, is under the jurisdiction of the Society's Committee C-9 on Concrete and Concrete Aggregates. Committee C-9 has 81 independent projects under consideration which cover a wide range in the field of concrete and concrete aggregates and progress reports are made on most of them.

The Sub-Committee on Unification of Specifications, under the chairmanship of W. A. Slater, has in charge the study of information developed by the several sub-committees to correlate it in such a manner as to form a complete specification for concrete. It is giving consideration to the quality of concrete and its constituent materials, proportioning and mixing, conveying and depositing, forms and curing, and any other factors entering into the quality of the finished product.

Methods for the design of concrete of a given quality are most important to a complete specification. Studies of this problem are being considered by a sub-committee headed by R. B. Young. Its objective is the preparation of specifications for proportioning. That sub-committee has under active consideration studies of methods of design for flexural strength, methods for securing high-early strength and studies of mortar voids. Several phases of its studies of flexural strength of concrete will be reported upon at the annual meeting of the Society this month. This will include information on the effect of moisture content in the concrete at time of test, surface characteristics of the aggregate and quantity of cement, etc.

Large Sand-and-Gravel Plant in Kansas Keeps in Step with Progress

Primitive Operating Methods Discarded by New Owners to Keep Abreast of Times

By L. M. BANKS

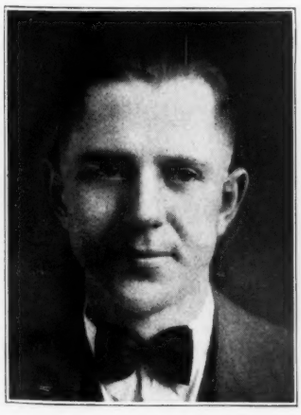
ONE of the largest sand-and-gravel plants in northeastern Kansas is operated by the Blue Rapids Gravel Co., Inc., on a large deposit about one and one-quarter miles west of Blue Rapids, Marshall County, Kan.

The deposit was first opened about 18 years ago as a wagon pit, with a capacity of only two cars per day. The overburden was scraped to one side of the small pit. The nearest railroad siding was about one mile away and the gravel was hauled by wagons. This primitive method of working was continued until about three years ago, when Grundeman Brothers, contractors in Blue Rapids and vicinity, acquired control and revised the working methods. They found the deposit had been worked down to a depth of about 30 ft. in places, but was still about 18 ft. above water-level. They installed a dragline-conveyor system for truck-loading. About ⅝-mile away they installed a loading dock on the railroad, where the trucks could drive up a ramp high enough to allow the material dumped from the bottom of the trucks to run into the railroad cars. The equipment had a capacity of 10 cars a day, and this method was continued until March, 1928, when the operation was incorporated as the Blue Rapids Gravel Co., Inc.

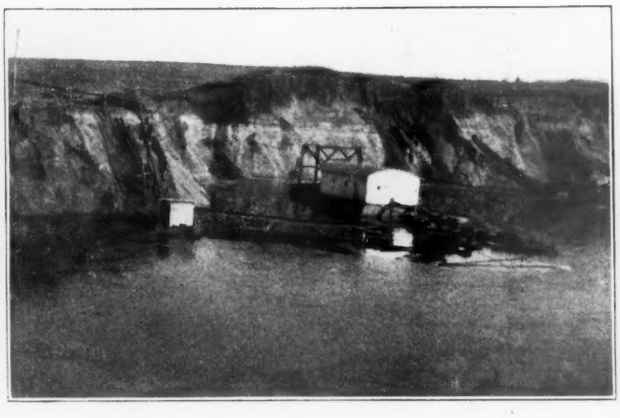
Soon after the incorporation, the operation reached water-level and a change to the wet method took place. An 8-in. sand pump, manufactured by the Western Foundry & Iron Works, Topeka, Kan., was set up on the bank and belt-driven by a 100-hp. General Electric 440-volt, 60-cycle motor. A rock trap was used instead of a digger. The suction nozzle was carried by a small pontoon and worked to a depth of 8 to 10 ft. under water. The only remarkable thing about this arrangement was the fact that it was able to operate with a suction line as long as 80 ft. by carrying the line under water and under the pontoon. This prevented any air entering the system to destroy the suction.

The pontoon was equipped with a Porter 2-drum hoist, driven by a 10-hp. General Electric, 440-volt, 60-cycle motor. One drum was used for raising and lowering the nozzle, while the other wound a shore-line for moving the barge. The gravel was pumped to a flotation or settling-basin system, where it was handled without screens, except one grizzly to scalp oversize rock and refuse. The gravel from this settling-basin system went to two storage piles, one on each side of the hopper. The wet gravel on these storage piles, each of about 8 cars storage capacity, was drained and then transferred into a truck-loading hopper of 12-cu. yd. capacity. This transfer was accomplished by a Speeder crane using an Erie clamshell bucket of ½-cu. yd. capacity. This crane was built by the Speeder Machinery Corp., Cedar Rapids, Ia. From the hopper, the gravel was loaded into two 2-ton Graham Bros. trucks and one 3-ton International truck. These trucks were loaded with 3 cu. yd. and 4¾ cu. yd. respectively. They were equipped with a bottom-dump device and were run to the same loading dock as mentioned above for the drag-reclaimed gravel.

This first step in the pumping method started in a small pond, 12-ft. by 16-ft., and continued until it had an area of about 100-ft. by 150-ft. with a depth of 7-ft. to 8-ft. At first there was a deficiency of water, so the overflow, from the settling-basin system, was sent to another settling-basin system built in the sand to catch the refuse and to conserve the water so it could be returned to the main

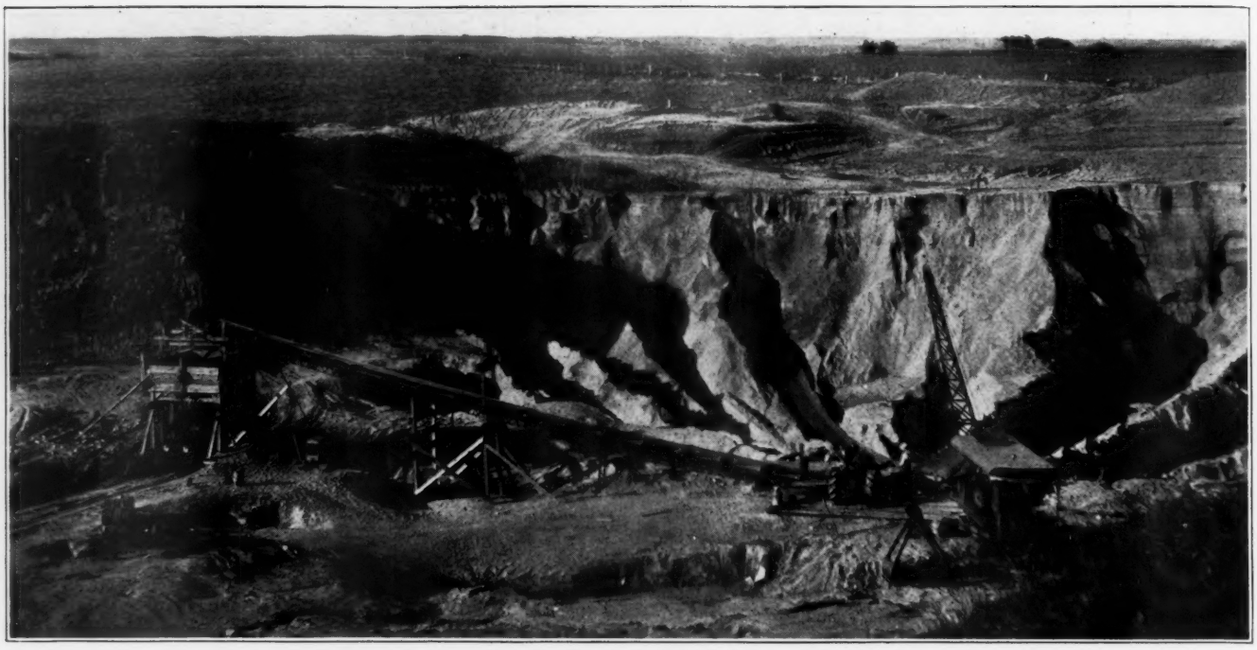


Ed Grundeman, president.



Dredge working on north side of deposit.

Crane and clamshell bucket.



Drag scraper and belt conveyor used previous to 1926.

pit by a flume. After reaching greater depths the return of this water was unnecessary and is not practiced today. Water-level in the present pit stands about 12 ft. higher than the level of the Big Blue River which flows to the north at a distance of one-half mile.

The plant was operated about one year by the foregoing method. The crew consisted of five operators and three truck-drivers. They were stationed as follows: One on the suction nozzle, one at the pump-house on the bank, one on the settling-basin system, one on the crane, and one loaded the trucks from the hopper.

The next step in the modernization of the equipment required by deeper operating conditions was the installation of the dredge and accessory equipment as now used at the plant.

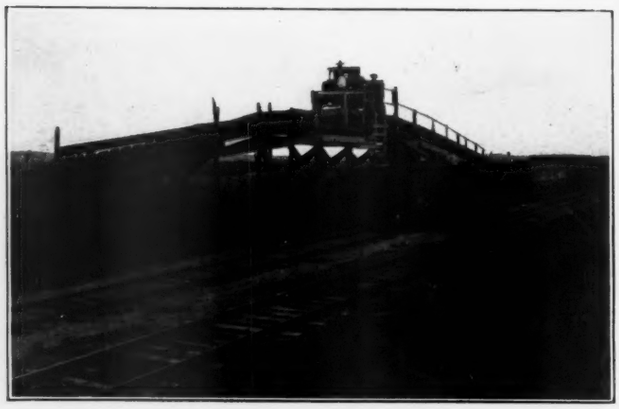
Before describing present operations it may be well to look into some of the other factors entering into the success of this company.

While there is some dispute as to the origin of the deposit, it is generally conceded to be of glacial origin. The present pit is about one-half mile south of the Big Blue River at a point near its junction with the Little Blue River. The present known area of the gravel is over one-half mile square and has a tested depth of 90 ft. The sand and gravel occur in thin layers, of different-sized material, often cross-bedded. While there are a few rocks up to 12 in. in diameter and an occasional large boulder, the percentage of this oversize is so small

Another view of the dry-loading operations.

that the average product probably runs about 60 per cent on a 10-mesh screen and very little over 1½ in. in size. The deposit is covered with an overburden of clay loam that varies in depth from nothing to a known maximum of 15 ft. The edges of the present pit show an average of three feet of overburden in place and some that remains from previous stripping operations.

The use of the dredge has extended the size of the pit to a present area of approximately 500 ft. by 1,000 ft. The small amount of overburden, in proportion to the working face of gravel, is such that no trouble is experienced in disposing of it in



Dock for loading from trucks into cars.

the washing plant; hence no effort is made to remove it ahead of dredging operations.

Climatic conditions permit wet loading, direct to cars, for about nine months per year and stockpile loading for twelve months. The usual crew for the nine-month season is six men, besides the superintendent and manager. This crew is cut to three men in the winter months.

The present pit is adjacent to and north of U. S. Highway No. 77 and Kansas State Highway No. 9, so that truck haulage is facilitated for nearby delivery. The Blue Rapids Gravel Co., Inc., has constructed a standard-gauge spur to the branch line of the Missouri Pacific R.R. that passes through the town of Blue Rapids. This spur is more than one-half mile in length. The company has constructed and owns about one mile of track altogether.

The power used is 6,600-volt, 60-cycle, a.c. supplied by the Kansas Light & Power Co. on a demand meter rate. Provision is made in the power contract so that the power can be cut off for the three winter months, if so desired. The 6,600-volt current is stepped down to 440 volts for motors' use by transformers (outside-type) mounted on skids so that they can be kept close to the work and thus avoid excessive line losses. Other transformers reduce to 110 volts for lighting service around the plant.

Shops, loading plant and waste pile. Edge of pit at right.

The working pit is on a 40-acre tract north of the highways mentioned and is held under lease on a royalty basis. The adjacent 40-acre tract to the south of the highways is also held and is being operated as a dry pit.

The new equipment has permitted the loading of a maximum of 40 cars per day, with a probable average of 20 to 25 cars a day. The usual loading time is 10 hr. per day but, in the rush season, this is extended to 18 hr. and the plant is so arranged that it can be operated for 24 hr. per day if necessary. No special lighting equipment is used for night loading.

The following classes of material are prepared and sold: Highway gravel, highway paving aggregate, bridge and culvert aggregate, concrete gravel, mortar sand, plastering sand, and roofing gravel.

These products are distributed over a territory within a radius of 100 miles and the market is limited only by prevailing rates and competition.

View of discharge line and hydraulic unit.

The steel dredge is made up of two sections, each 12 ft. by 50 ft. in size, joined together in the center by six pins. A 12-ft. by 12-ft. well is left in the front center for the digging ladder. The steel hull has a depth of 5-ft. and is covered with a wooden floor that supports the wooden housing over the machinery.

The front end has a steel A-frame or gantry for handling the 40-ft. steel ladder which carries the suction line and digging mechanism, a Swintek screen nozzle built by the Eagle Iron Works of Des Moines, Ia. The digging-ladder hoist is a Sampson single-drum, friction-clutch type, gear-driven by a 15-hp. Fairbanks-Morse, 440-volt motor. This hoist is wound with a ¾-in. steel cable to raise the digging ladder and is operated by push-button control. It is run only for raising the ladder.

The suction line consists of 8-in. standard steel pipe with two bends, one of rubber hose. It is provided with an American Manganese Co. gate-valve for priming purposes.

The sand pump is an 8-in. cast-iron, centrifugal, made by the Western Foundry & Iron Works. It has a 4-vane, enclosed impeller of 32-in. diam., running at 580 r.p.m. The shell is fitted with cast-iron lining plates. The pump is driven by a 16-in., 8-ply, U. S. Rubber Co. Matchless belt from a 200-hp. Westinghouse slip-ring, slow-speed motor.

The Swintek digging chain is operated by a

Conveyor reclaiming material from stockpile.

One of the delivery trucks.

15-hp. Westinghouse slip-ring motor, 900 r.p.m., driving a belt to the clutch shaft and thence by gear reduction. Chain speed is about 70 ft. per min. This same motor also drives, from a jackshaft, a 2-in. Gould centrifugal pump for priming use and to supply gland water to the 8-in. sand pump.

Because the pump operator cannot see the discharge end of the pipeline, both the suction and the discharge lines are equipped with gauges to enable him to judge the work of the pump. The combined static and friction head is 136 ft. The pressure gauge on the discharge line shows about 65-lb. pressure in normal operation. Movement of the dredge is by means of three hand-operated Sampson winches attached to the shore-lines.

The rated capacity of this pump is 2,000 gal. of water per min. at a velocity of 12 to 15 ft. per sec. When pumping gravel, this capacity and velocity are lowered, but no data are available as to their actual values. The best operation and the most efficient work are obtained when the flowing material is kept at a certain density determined by experience. The velocity under these conditions is about 10 ft. per sec., but, as no testing has been done at this point of maximum efficiency, the density figure is unknown.

The pipe used is 8-in. oil-well steel casing and has an average life of one year. Cast-steel, 90-deg. ells have a life of six months on the suction line and a 90-day life on the discharge line.

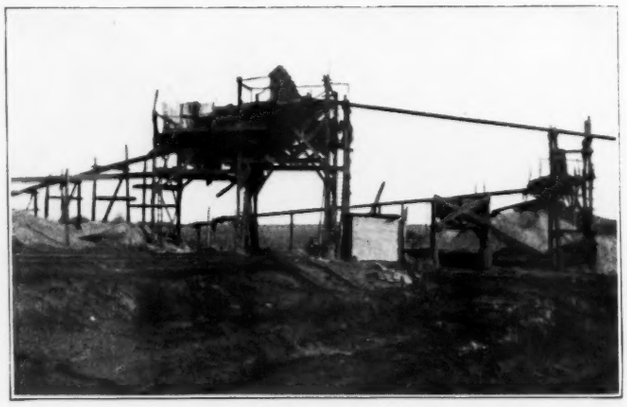
The sand-discharge line consists of the same kind of 8-in. standard steel pipe, joined by standard cast fittings, sleeves, and some quick-detachable, flexible joints, although some of the bends are of rubber hose. Barrel pontoons are placed at close intervals to support the discharge-line from the dredge to the shore. A single line of pipe extends from the dredge to the top of the pit or natural surface. From this point on, there are two lines—one to the screening plant, the other to the stockpile. Change from one to the other is made at a standard flange-coupled joint.

Water, for loosening the gravel hydraulickly ahead of the dredge, is furnished by a 3-in. Wesco centrifugal pump, belt-driven by a 15-hp. LeRoi gas engine. This hydraulic unit is mounted on a separate barrel pontoon, 12-ft. by 18-ft. in size, so that it can be moved readily to any desired point. It is usually employed in breaking down the gravel bank ahead of the dredge but, in case of a choke-up in the discharge line of the 8-in. sand pump, the unit is ready to be attached to various points in the discharge line so that the full pressure can be used in clearing the line. This hydraulic water is transmitted, by means of ordinary quick-coupled fire hose, to any needed point, where it is reduced by a ¾-in. nozzle to a stream of sufficient force to reach a vertical height of 60 ft. with a lateral range of about 80 ft.

The discharged material from the main sand-line flows over a wide apron at the top of the screening plant, so that the gravel is spread out in a flat sheet before it reaches the first stationary screen. The first screen has a jacket with 12-mesh openings. The sand that passes through this screen falls directly to a settling tank so placed over the railroad tracks that the settled sand can be spouted into cars on either track as desired. The overflow from the above screen passes over a rod grizzly, having a spacing of ¾-in., the function of which is to remove oversize and refuse not wanted in the finished product. The undersize from this grizzly falls against an adjustable baffle which directs the flow against a 10-mesh screen to dewater the gravel. Regulation of this baffle permits the desired gradation. The waste water from this second screen is used to transport the oversize reject from the grizzly to the waste pile in a wooden flume.

This simple screening plant is so devised that a car of sand can be loaded on one track while a car of road gravel is being loaded on the other track. Chutes from the two classes of product are so placed that any desired combination of the two can be made by mixing as they run into the cars. The sand compartment, or settling-cone, has a storage capacity of about 20-cu. yd., but the road gravel goes direct to the cars. Ludlow-Saylor screens are used as standard equipment.

When loading is not in progress at the screening plant, the discharge line to it is broken and the line is so connected that the flow can be diverted to the stockpile. Here the discharged material is run



Screening plant. Stockpile in background.

over a grizzly to remove oversize and refuse, but it is not separated into different products. Road gravel is the only stockpile product. This reserve supply has a storage capacity of 14,000 cu. yd. when full. Excess water and refuse are flumed to waste overhead.

A steel-frame Russell belt conveyor having a length of 50 ft. and carrying a Russell belt 24 in. wide, is mounted radially to the stockpile in such a manner that it can discharge into the railroad cars. At right-angles to the center-line of this first conveyor and tangential to the pile is another conveyor of the same type and size except that its length is 110 ft. Its discharge is raised just high enough to load onto the first conveyor. The first conveyor is driven by a 15-hp. LeRoi gas engine, while the second is driven by a 10-hp. General Electric motor. Both conveyors have a belt speed of about 225 ft. per min.

A movable steel hopper is placed over the tangential conveyor to serve as a feeder bin. This hopper is kept filled by a Speeder crawler-mounted crane using a ½-cu. yd. Erie clamshell bucket. This combination of crane and movable hopper can load from any desired point along the side of the long conveyor. During the process of reclaiming the stockpile for dry loading, this conveyor can be so moved about as to clean up the pile if necessary.

There is not enough oversize rock to justify the installation of a rock crusher at the property. A Thew ¾-cu. yd. steam shovel is kept on hand for stripping operations and odd jobs. A well-equipped shop with lathe, forge, and oxy-acetylene welding outfit is maintained, and a blacksmith to care for repair work. In the warehouse, duplicate parts for the pump—such as impeller and shaft, liners, side plates, stuffing-boxes, center main bearings, and shells—are kept in stock. One or two extra motors as well as motor brushes, oil-switch parts, a complete priming pump, and a set of belts are always kept on hand for emergency use.

The company maintains two 2-ton Graham Bros. and one 3-ton International bottom-dump trucks for service use. A team of horses is available for odd jobs.

The officers of the Blue Rapids Gravel Co., Inc., are as follows:

Ed. Grundeman, president and manager; Otto Grundeman, vice-president; W. R. Canfield, secretary-treasurer; and Clyde Ammon, plant superintendent.

The writer wishes to acknowledge the kindness and courtesy of the management, and of Ed Grundeman, president and manager, in particular, for the information contained herein.

Vanport Seam of Limestone Mined by Triangular Block-Cut Method

The principal reason for the adoption of the underground method of working limestone in preference to the old, established open-quarry method is usually such an increase in the depth of overburden as to make its removal slow and costly. Another reason for the underground method is that operations can be carried on the year around in all kinds of weather and this is often a very great advantage.

The Vanport seam of limestone in western Pennsylvania, which supplies enormous quantities of limestone for the steel industry of this district, for road building and for the manufacture of Portland cement, is one of the deposits where numerous mines have been developed. In most of these mines the system of drilling and blasting in use is that known as "the triangular block cut."

The Vanport seam of limestone occurs in well-defined horizontal ledges, the strata varying in thickness from 10 ft. to 22 ft. Mines are usually developed on a room-and-pillar system, or, in some instances, this is modified to a room-and-rib-pillar system. Rooms are worked from 30 ft. to 40 ft. in width, depending on the thickness and character of roof material. Crosscuts and entries are carried from 25 ft. to 30 ft. in width. The major part of the loading is accomplished by mechanical means. Roof conditions are favorable to mining, and normally little or no timbering is required. It is usual practice to leave 2 ft. to 4 ft. of the producing ledge intact in order to insure a firm roof to support the overburden, the exact amount of material left up being determined by the most convenient parting. On account of the flat stratification of the seam, tunnel or drift entries are common practice. All development so far is on the advance and no attempt has been made as yet to recover any of the supporting pillars.

The method of advancing both rooms and entries consists in blasting successive V cuts, each of which breaks down a roughly triangular block of stone. After the first or tight V is taken out of the face, two cuts can be blasted at once in each room or entry.

Composition and Characteristics of Domestic Fuller's Earth

Fuller's earth is the trade name applied to any natural, clay-like material used in the refining and decolorization of mineral, vegetable or animal oils. It is a hydrous aluminum silicate of variable composition with usually greater amounts of lime and magnesia than are found in ordinary clays. It may or may not be plastic. Some earths will slake down or disintegrate in water while others will not. When dry, lumps often break with a conchoidal fracture. Common colors are brown, gray greenish white, buff to yellow, and occasionally pure white. All true fuller's earth will show an acid reaction, although no free acid is present.

Fuller's earth usually occurs as bedded deposits along with other clays, sands and gravels. In Arkansas, however, where the first fuller's earth in the United States was discovered, the material occurs in steeply-dipping veins.

View of inclined screens at washer of Lake Wales, Fla., plant.

Sand Plant in Central Florida Abandons Dry Mining and Installs Dredge

By J. R. CUDWORTH
School of Mines, University of Alabama

THE Diamond Sand Co., near Lake Wales, Polk County, Fla., has an excellent body of high-grade sand which is extensively used throughout Florida as fine aggregate for concrete. This company also operates a sand plant at Kenka, Putnam County.

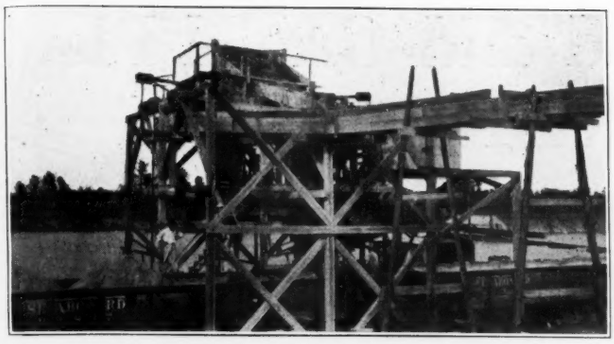
The property, located at Lake Wales and comprising 200 acres, has been thoroughly prospected and has a large proved reserve. It has been in operation for several years although not continuously. Dry mining was carried on for several years until the size of the pit made the pumping of seepage water too expensive for continued operations under this method. For the last few years operations have been conducted by dredging. The sand, which occurs in the Citronella formation, varies somewhat in color and texture from the surface downward, but with depth becomes almost pure white and uniform in texture. After washing out the finer sands, a well-graded product suitable for concrete sand is retained.

At the present time a pond covering considerable acreage has been formed from which the sand is removed by a 10-in. Allis-Chalmers centrifugal pump driven by a 200-hp. electric motor installed on a dredge. The dredge was designed to utilize

Return of fines and water to pit.

One of the two sand cones.

View of the dredge boat.



Close-up of washing and screening plant.

a minimum amount of labor and contains, in addition to the main pump, an Allis-Chalmers electrically-driven priming pump and a cable hoist for raising and lowering the suction pipe and for pulling the dredge. The cable hoist, also made by the Allis-Chalmers Manufacturing Co., is equipped with Cutler-Hammer control.

The hull of the dredge, which is of simple design, is left open for easy inspection of the equipment. Sand is dredged to a depth of 50 or 60 ft. from the surface. The 10-in. pipe from the dredge to the top of the washing plant has flexible joints, where necessary, and is supported on pontoons.

The washing plant consists of home-made inclined screens to remove a few large pebbles and

Railroad cars are loaded with ease.

sand concretions. The undersize of the screens is fed into two 96-in. Link-Belt hydraulic cones, set to eliminate the fine sand below 100-mesh and some clay which is present. The product of the Link-Belt cones feeds directly into the railroad cars. Various proportions of sizes can be made by adjusting the cones. The overflow from the hydraulic cones is discharged into the pond at locations where the deposit has been worked out.

A small home-made electrically-driven cable hoist pulls the empty railroad cars, up a 5-per cent grade, to the washer, and the filled cars are returned by gravity. The capacity of the plant is about 165 tons of product per hour. All equipment is driven by electric power which is purchased from outside sources. The plant is equipped with flood lights for continuous running.

The plant's output is sold for concrete sand which is shipped over the Seaboard Air Line R. R. whose tracks are adjacent to the property. The entire plant is so designed as to require but four men to operate it. The officials of the Diamond Sand Co. are C. G. Memminger, president, and S. D. Gooch, vice-president and general manager.

Recent Standards for Diamond Core Drill Fittings are Published

The Bureau of Standards has published an illustrated pamphlet describing the new commercial standards for diamond core drill fittings that have been adopted as the result of the Bureau's efforts in securing co-operation between manufacturers, drilling contractors and others interested in the subject.

The aim of the new standards is to make diamond core drill fittings, such as bits, casing and rods, as produced by the various manufacturers, interchangeable in the field, insofar as controlling diameters, threads, and dimensions of joints are concerned, and furthermore to provide a convenient series of nesting casings, permitting three reductions in diameter below a three-inch hole. The benefit to contractors and other users of the equipment is obvious.

To insure that the fittings actually are interchangeable, the manufacturers have adopted a carefully controlled system of gauging, made effective by means of working gauges in constant use in the various plants as a guide to satisfactory production.

As a further safeguard to the user and in order that he may know that the fittings he requires conform to the new standards, the working gauges can be procured only through the Diamond Core Drill Manufacturers Association, and the Association has adopted an emblem to be attached to products made in conformity with the new standards, or on packages or cartons containing standard goods. These emblems are supplied only to manufacturers who have purchased the necessary gauges for producing the new standard diamond core drill fittings. The new fittings are now in production.

The government pamphlet is entitled "Diamond Core Drill Fittings—Commercial Standard C. S. 17-30" and copies may be procured upon application to the Bureau of Standards at Washington; to C. H. Rohrbach, Secretary of the Diamond Core Drill Manufacturers Association, 90 West Street, New York; or to the manufacturers of the fittings.

Mining and Quarrying Industries Are Largest Users of Explosives

Eighty per cent, by weight, of the total quantity of explosives sold and used in the United States is consumed by the mining and quarrying industries. The mineral industry also uses large quantities of nitroglycerin at oil and gas wells, but figures showing the quantities used are not available. The mines and quarries of the country used about 400,000,000 lb. of black blasting powder, permissible explosives, and high explosives other than permissibles out of the year's total sales of approximately 500,000,000 lb. for all purposes.

Fully Automatic Sand-and-Gravel Plant Operated Near London, England

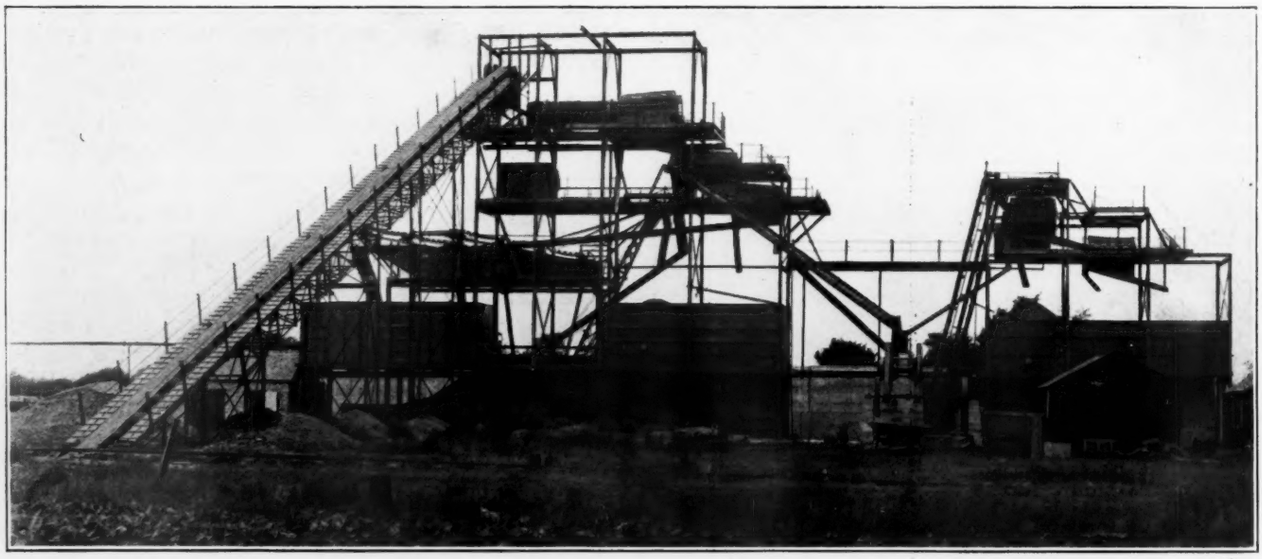
By E. ARMITAGE
Secretary, Goodwin, Barsby & Co., Ltd., Leicester

THE sand-and-gravel plant of the Hatton Sand & Ballast Co. is situated on the Great Western Road (Staines Extension) and is in a very commanding position, being only about 15 miles from London. The plant was designed by Goodwin, Barsby & Co., Ltd., of Leicester. It is an all-steel operation built on virgin ground, no pit having been in operation before and, although water is reached at about 3 ft. or 4 ft. below ground level, the evidence seemed to indicate that a certain amount of clay or ironstone might be encountered. This proved to be the case when production was started and it was partly for this reason that dredging the material by means of a centrifugal pump was not adopted.

Under the circumstances, therefore, there being no previous machinery, the layout of the plant could be considered right from the start, so it was eventually decided to remove the overburden by means of a Priestman skimmer scoop and excavate the gravel by means of a 1¼-yd. Ruston dragline on crawlers. The gravel is deposited direct into side-and-bottom-opening 2-cu. yd.-capacity wagons, made specially for this installation for G. M. Eden, the superintending engineer, for conveyance to the washing-and-crushing plant. These wagons are propelled by means of petrol (gasoline) locomotives to a feed hopper over an automatic feeder. This hopper has a capacity of 16 cu. yd., and the rails run over the center of it, while underneath it is a 30-in. tray feeder which draws the material from the hopper and regulates the feed to the belt conveyor, carrying the material to the plant. It was decided at the outset that it would be advisable to meet local conditions of the trade by installing two separate sets of screens and storage hoppers, for the crushed and uncrushed material, respectively. It was, therefore, necessary to arrange that the crushing section of the plant be entirely automatically fed and, in addition, it had to be capable of consuming and recrushing its own rejections, as well as any other size it might be desired to crush from the "uncrushed" or washing plant.

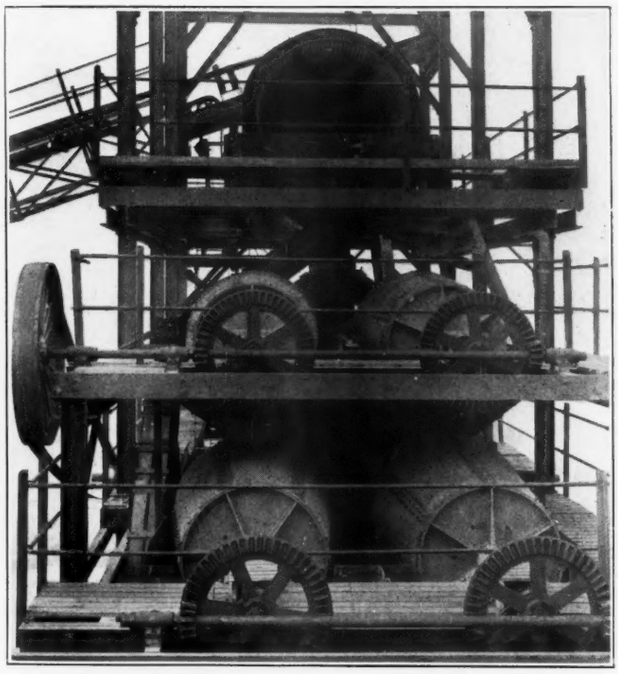
The rated capacity of the plant is 60 cu. yd. per hour, all material over ¾-in. in size to be reduced to that size or less—and no difficulty was experienced in achieving and maintaining an output in excess of this—with a storage capacity of 200 tons of each size of uncrushed material in overhead bins, and of 50 tons of each size of the crushed material, with an overflow ground storage of the same capacity. This necessitated a rather high structure, but the main condition governing its height was the conducting of the rejections from the washing screens to the crushers, for which gravity chutes were arranged. It was deemed advisable to fix these at such a height above ground as to make it unnecessary to have the boot of the elevator, into which the two crushers discharge their product, below ground level. The height, therefore, from ground level to the discharge of the feeding conveyor is 62 ft.

This conveyor is of the troughing belt type, 24 in. wide, on 216-ft. centers, and to enable the delivery into the hopper over the feeder to be made from ground level it had to be taken some 16 ft.



View of plant of Hatton Sand & Ballast Co. near London, England.

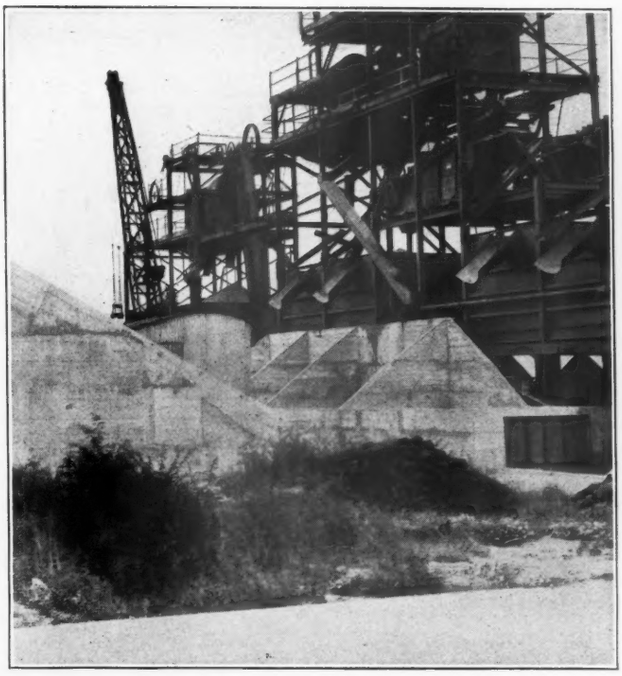
below ground level (and incidentally, of course, below water level) but this avoided any necessity for providing a feeding gantry or ramp. The conveyor delivers direct to a Goodwin scrubber, size 4½, on the end of which are fitted cantilever type revolving screens perforated with 1¾-in. and ⅞-in. holes. The rejections from the inner cylinder, that is, the material over 1¾-in. passes, by means of a chute into a 30-in. Goodwin granulator in the crushing section of the plant. The material passing the 1¾-in. mesh and rejected by the ⅞-in., goes to a set of 30-in. Goodwin rolls. All the material passing the ⅞-in. holes, together with the washing water from the spray pipes is divided by means of a Y chute and delivered to the two No. 4 cantilever-type screens both of which are perforated with ½-in. holes. The rejected material from these screens is the uncrushed ¾-in. gravel and goes into the overhead bins, whilst the



Cantilever-type washing and sizing screens.

material passing the ½-in. holes goes direct to another pair of screens exactly the same as the previous pair except that they are perforated with 3/16-in. holes. The rejects from these screens is the ⅜-in. material. The sand and water passing these holes is conducted by means of long steel chutes to two separate No. 4 Goodwin sand-dewatering tanks designed on the flight-conveyor principle, which are arranged in such a way that they will deliver de-watered sand either into overhead bunkers designed to take this material or into concrete ground-storage bunkers alongside the main structure of the plant.

By a by-passing arrangement, it is possible to deliver either the whole of the material as it comes from the washer unscreened into ground storage alongside the plant, or any individual size of material separately, up to and including the rejects.

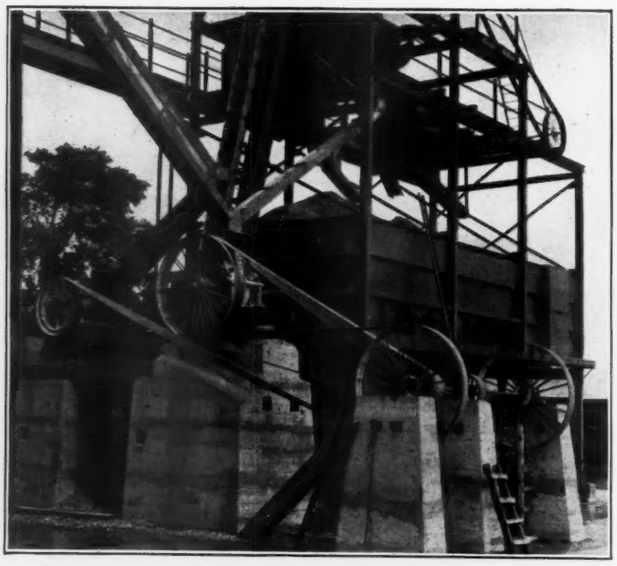


Concrete ground storage, rehandling crane, and overhead steel storage bins.

This obviates the necessity of stopping operations of the whole plant, and the pit as well, in the event of necessity arising for stopping work at the crushing plant, and allows a much greater elasticity of operation, and a greater ability to supply a varying demand.

The two crushers used in the crushing portion of the plant, as mentioned above are one 30-in. Goodwin granulator taking the material above 1¾ in. and a set of 30-in. Goodwin rolls taking the material between 1¾ in. and ⅞ in. A second set of 30-in. Goodwin rolls is now being installed alongside the above mentioned set, and should result in a substantial increase in production, as the conveyor, screens and washers are capable of dealing with considerably more than the rated capacity. These crushers are fitted with manganese-steel wearing parts, and all other parts such as bearings, etc., are both renewable and interchangeable with other machines of the same type and size. This enables replacements to be procured and effected with maximum ease and speed.

Both the granulator and the rolls deliver their product into an 18-in., back-strand supported Goodwin bucket elevator, with continuous, overlapping buckets built up of steel plate mounted on balata belt. This elevator, operating on 41-ft. centers, delivers into a No. 4 Goodwin tapered screen of the cantilever type, which is perforated with ⅞-in. holes, and has an outer jacket carrying ½-in. holes. The rejects from the inner cylinder, if any, automatically fall to the 30-in. rolls below for recrushing; whilst the material passing through these holes, and rejected by the ½-in. perforations forms the ¾-in. material. That passing the ½-in. holes follows the same procedure as the material in the uncrushed-stone portion of the plant, and goes



Crusher and bucket elevator. Note the large, slim-spoked pulleys.

to a similar screen, perforated with 3/16-in. holes for sand, the rejections from these screens being the ⅜-in. material. In each of these screens a water spray is provided to assist the material through the perforations, and wash away the fines coming from the newly-crushed product. Sand-de-watering tanks are provided, and the sand and water passing the 3/16-in. holes goes into a sand bin in the crushed-stone structure, which is provided with a water-tight hopper door underneath, and with perforated plates in the side of the bin for weiring the water away.

A large centrifugal pump, driven by a separate power unit, is used for providing the water and both are housed in a small brick building, some 30 yards away from the plant.

All power is provided by electric motors, the pump having a 40-hp. motor, the feeder, conveyor, washing screens and the sand de-watering tanks being driven by one 80-hp. motor, whilst the crushers are driven by another motor of similar power. The elevator and screens in the crushing section of the plant are driven by a 20-hp. motor. All motors and their starters are housed to protect them from the elements and from waste water from the plant. There is a separate control house at the foot of the plant from which various parts of the plant are controlled and, in the case of accident or enforced delay, any portion of the plant may be stopped at will without the necessity of going to the particular motor driving that portion. The plant is thus entirely automatic, and there is no necessity for any hand labor around the plant beyond the ordinary mechanical adjustments and lubrication always attendant upon machinery.

From the overhead storage bins there are chutes which automatically deliver, into the large ground-storage bins alongside, any overstock of a particular size for which there may not, at the moment, be a ready market. Alongside these ground-storage bins is a crane track upon which a 5-ton grabbing crane travels. At the other side of the crane track further ground-storage bins, also built of concrete, are provided, into which the overflow of the ground storage can be transferred should the necessity arise. Alongside the crane track is a road for motor lorries to enable them to be loaded by the grabbing crane from any of the ground-storage bunkers.

The plant is adequately equipped with ladders and platforms. There is a railed platform up each side of the conveyor belt, and it has been so arranged that a fitter or mechanic can proceed up this conveyor platform and go all round the plant carrying out his duties without returning to the ground again. He may also proceed, by means of a bridge, from the uncrushed-stone plant to the crushing plant. This greatly adds to the efficiency of the operation, and makes the supervisor's work much easier.

Tamping Blocks for Blast Holes

(Continued from page 30)

A somewhat similar tool which has been found nearly, if not quite, as effective is shown in Fig. 2 and this can be quickly made from an oak 2-in. by 4-in. plank. Fig. 3 shows another modification made from a 2-in. by 4-in. plank, in which the bottom section is cut to a 3-in. width and then tapered to a chisel edge about ¼ in. thick. It is well to have both these types of tools available for there are some conditions under which one works better than the other.

Either of these 2-in. by 4-in. tampers can be used satisfactorily in water up to 7 ft. deep without being weighted. If the hole contains more water than this and cannot be bailed, as it should be for the most efficient loading, then a weighted block is likely to be needed. When cartridges are being loaded under water, they may sometimes lodge on slight irregularities in the sides of the hole. The hole is not actually plugged but may become plugged under careless and too vigorous tamping. For such a condition, a weighted cylindrical block is recommended, 4 in. in diameter and 2½ ft. long. By lowering this block carefully to the top of the stuck cartridge and then gently churning it up and down a few times, a suction is created which will generally cause the dynamite cartridge to work loose and sink to the bottom. Fig. 4 shows a good method of weighting a block to prevent the pieces of babbitt from working loose and projecting from the block. The block shown in Fig. 5 is a poor type because the cigar-shaped end is likely to spread a stuck cartridge and wedge it in the hole.

Having several different tamping blocks at hand when a hole becomes plugged in loading may save valuable time and may prevent a serious accident. Whatever type of block is used, its surface should be smooth, it should not contain any steel or iron and it should not be unnecessarily heavy.

Safety in Spotlight at Spring Meeting of Portland Cement Association

Representatives of 27 Accident-Free Plants Formally Presented with 1929 Safety Trophies

SAFETY awards and trophies for distinguished progress in the field of industrial accident prevention occupied the spotlight at the spring meeting of the Portland Cement Association held at the Biltmore Hotel, New York, N. Y., May 26, 27 and 28.

On Wednesday afternoon May 28, Daniel Harrington, chief engineer of the United States Bureau of Mines, and a director of the Joseph A. Holmes Memorial Association, conferred upon the Portland Cement Association the Joseph A. Holmes Safety Award for 1929, carrying with it a citation for unusual achievement in preventing loss of life or injury to the workers employed in the cement mills of its members. In a second ceremony following the Holmes award, 27 cement mills, representing almost every producing section of the United States, were formally presented with the Portland Cement Association Safety Trophy for 1929, awarded to each for completing the year without the accidental loss of time or permanent injury to a single workman.

The Joseph A. Holmes award, won by the Portland Cement Association, carries with it unusual significance. So far as is known, no other trade association has ever received this or any similar award in the field of accident prevention. The Holmes Award was founded in honor of the first director of the U. S. Bureau of Mines who was also author of its safety program, as a means of conferring distinction upon industrial concerns for conspicuous service in the work founded by Director Holmes. In the citations announcing the Association award, attention was called particularly to the surprising increase in the number of mills operating for a calendar year without accident. In 1924, after the Association's accident-prevention work had been in progress 10 years, a mill succeeded in operating from January 1 to December 31 without injury to any workman involving the loss of even a day's time.

E. D. Barnett, superintendent, Cowell Portland Cement Co., Cowell, Cal. This plant has the longest safe record in the industry.

C. A. Swiggett, superintendent, Lehigh Portland Cement Co. plant at Iola, Kan.

F. C. Brownstead, superintendent of the Alpha Portland Cement Company plant at Ironton, Ohio.

During the succeeding period 60 mills have made similar one-year records, 27 of them, or 45 per cent of the total number, during 1929. Last year one-fifth of all of the operating cement mills of America completed the year without a lost-time accident. According to data recently released by the National Safety Council, the cement industry's accident-frequency rate for 1929 was the lowest for

A. D. Stancliff, general superintendent, Southern division, International Cement Corporation.

W. W. Deadman, superintendent, Lone Star Cement Co., Alabama; Spocari, Ala., plant.

R. C. Mathews, superintendent of Marquette Cement Manufacturing Co.'s plant, Cape Girardeau, Mo.

M. P. Greer, safety engineer, Cape Girardeau plant, Marquette Cement Manufacturing Co.

R. H. MacFetridge, superintendent, Birmingham, Ala., plant of the Lehigh Portland Cement Co.

J. W. Johnston, vice-president and manager, Lone Star Cement Co., Alabama.

J. Stanley Downs, superintendent, Hercules Cement Co. mill at Nazareth, Pa.

R. J. Landis, superintendent, Medusa Portland Cement Co., York, Pa., plant.

Adam L. Beck, president, Great Lakes Portland Cement Corp.

J. J. Oakes, superintendent, Lone Star Cement Co., Louisiana; New Orleans Plant.

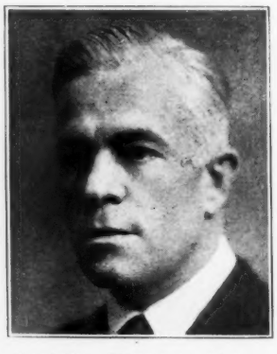
D. S. MacBride, vice-president and manager, Lone Star Cement Co., Pennsylvania.

W. D. Lober, president, Vulcanite Portland Cement Co.

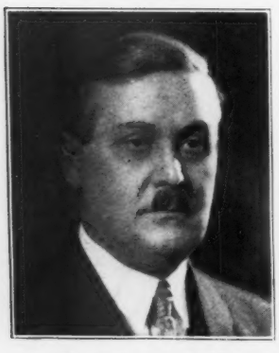
W. J. Worthy, superintendent, Medusa Portland Cement Co. Toledo, O., plant.

G. A. Lawniczak, superintendent, Alpha Portland Cement Co. plant at Bellevue, Mich.

William J. Montz, superintendent, Ormrod, Pa. plant, Lehigh Portland Cement Co.



Dwight Morgan, vice-president and manager, Lone Star Cement Co., Virginia.



J. B. John, president, Medusa Portland Cement Co., Newaygo, Mich.

Lester E. Palmer, works manager, Wabash Portland Cement Co., Osborn, O.

L. V. Robinson, superintendent, Victorville, Cal. plant, Southwestern Portland Cement Co.

Scott Thompson, vice-president and manager, Lone Star Cement Co., Louisiana.

J. W. Ganser, assistant superintendent, Trinity Portland Cement Co. plant at Dallas, Tex.

O. V. Bartholomew, general superintendent, Trinity Portland Cement Co. The Trinity mill at Dallas earned the trophy in both 1928 and 1929 and the Houston mill in 1929.

R. G. Sutherland superintendent, Trinity Portland Cement Co. plant at Houston, Tex.

any industry reported and less than half the average rate for the various groups.

Adam L. Beck, president of the Great Lakes Portland Cement Corp., and for many years a director of the Portland Cement Association, accepted the Holmes Award on behalf of the Association and its members.

The Portland Cement Association Safety Trophy was formally presented to the 27 winning mills by J. B. John, president of the Medusa Portland Cement Co., and chairman of the Association's committee on Accident Prevention and Insurance. Two delegates from each of the winning mills, 54 in all, were present to receive the award as representatives of their plant organizations. Their trips to New York were paid for by the Association as a part of the award. These delegates were as follows:

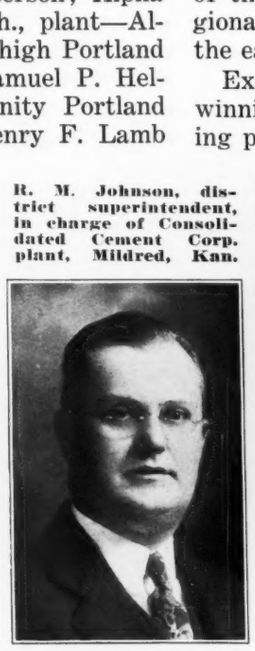
Cowell Portland Cement Co., Cowell, Cal., plant—Henry A. Stenger and Frank A. Isberg; Lehigh Portland Cement Co., Iola, Kan., plant—James A. Fisher and Lloyd Carter; Alpha Portland Cement Co., Ironton, O., plant—W. L. Patterson and J. B. Hall; Consolidated Cement Corp., Mildred, Kan., plant—E. L. Drury and P. L. Patterson; Alpha Portland Cement Co., Bellevue, Mich., plant—Albert Toutant and Gilford Leeser; Lehigh Portland Cement Co., Ormrod, Pa., plant—Samuel P. Helfrich and Francis E. Laubach; Trinity Portland Cement Co., Dallas, Tex., plant—Henry F. Lamb and C. A. Sutherland; Universal-Atlas Cement Co., Duluth, Minn., plant—F. O. Robinson and O. B. Potter; Lone Star Cement Co., Alabama, Birmingham, Ala., plant—E. T. Rasco and L. K. Briley; Hercules Cement Co., Nazareth, Pa., plant—Ernest M. Ayres and Marvin H. Parsons; Medusa Portland Cement Co., Toledo, O., plant—J. K. Schoenegge and B. F. Hobbins; Lone Star Cement Co., Alabama, Spocari, Ala., plant—Warren T. Lambert and Raymond A. Grable; Southwestern Portland Cement Co., Victorville, Cal., plant—Frank M. Arnold and Harry Sergeant; Lehigh Portland Cement Co., Ormrod, Pa., plant—Lloyd E. Diehl and Anson Sittler; International Cement Corp., Spokane, Wash., plant—H. T. Brewer and F. W. Sandoz; Lehigh Portland Cement Co., Birmingham, Ala., plant—W. H. Jones and Charles F. Walters; Lone Star Cement Co., Louisiana, New Orleans, La., plant—W. R. Foster and J. F. Lowry; Lone Star Cement Co., Virginia, Norfolk, Va., plant—O. H. Enax and Robert Stevens; Lone Star Cement Co., Pennsylvania, Nazareth, Pa., plant—Frank E. Leh and Edward M. Norris; Wabash Portland Cement Co., Osborn, O., plant—Donald Swartout and R. M. Walker; Trinity Portland Cement Co., Houston, Tex., plant—R. G. Sutherland and A. E. Flowers, Jr.; Vulcanite Portland Cement Co., Phillipsburg, N. J., plant—Floyd M. Brinker and Cleveland M. Rhen; Medusa Portland Cement Co., York, Pa., plant—C. W. Rowe and H. A. Leonard; Pacific Portland Cement Co., Redwood City, Calif., plant—Philip Forsyth and Harry Stephens; Alpha Portland Cement Co., Cementon, N. Y., plant—Earl Sandt and Donald Ziegler; Great Lakes Portland Cement Co., Buffalo, N. Y., plant—J. T. Huston and Patrick R. Jordon.

At the formal ceremony, at which President Frank H. Smith of the Association presided, the records of the winning mills were read and certified to, the delegates occupying places of honor at the front of the assemblage in the Biltmore Music Room. Each was called upon to arise and receive the distinguished honor from Chairman John.

The delegates were the guests of Mr. John at dinner in Hotel Commodore, New York, on Monday evening, May 26, at luncheons on May 27 and May 28, and at a formal dinner in the Biltmore on May 27. Before returning to their homes many of the delegates went to Easton, Pa., for the regional safety meeting held on May 29, as guests of the eastern cement plants.

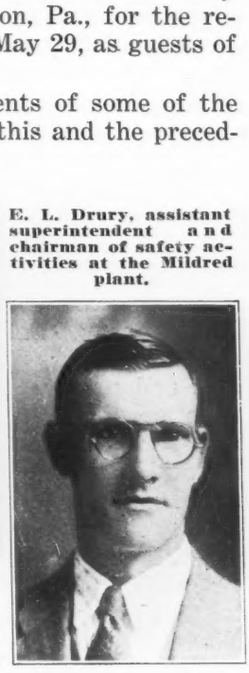
Executives and superintendents of some of the winning mills are pictured on this and the preceding pages.

R. M. Johnson, district superintendent, in charge of Consolidated Cement Corp. plant, Mildred, Kan.



J. E. Curtis, general superintendent, Consolidated Cement Corp., whose Mildred, Kan., plant is again a trophy winner, with 1020 accident-free days to Jan. 1, 1930.

E. L. Drury, assistant superintendent and chairman of safety activities at the Mildred plant.



Lime—Its Economic Importance and Use in Our Modern Scheme of Life

By NORMAN G. HOUGH
President and General Manager, National Lime Assn.

THE lime industry is one of the oldest industries in the world, and without question, one of the most useful. The uses for its products are varied and extensive almost beyond belief. Perhaps no other industry is of greater importance to the people of the United States in the production of the three great necessities of life—food, shelter, and clothing. Many manufactured products require lime somewhere in the fabricating process and, without it, plant and animal life would probably cease entirely.

Many of the present-day uses of lime were discovered, developed, or improved through scientific investigation. Lime in concrete is now sound, economic practice, the result of investigations and experiments which were started as early as thirty years ago. One of the greatest complaints in the building industry today is that masonry walls of our modern buildings are not made watertight. This develops needless and expensive repairs. Here again, lime is providing its efficiency as a masonry mortar and contributing greatly to the elimination of waste. Likewise lime plaster is filling the needs of architects who seek satisfactory acoustical conditions in buildings where such conditions are necessary.

In many of our American cities the water supply contains a considerable percentage of mineral salts. It is commonly known as "hard water." Nearly everyone is familiar with the hard-water problem. Its effect is apparent by discoloration of enameled fixtures in bathrooms, by lack of whiteness in laundered garments, and by plumbing bills necessitated by scale formation in water pipes. Lime is a material depended upon to remove the mineral elements which bring about these undesirable and costly effects. Over one hundred cities have already installed water-softening plants, but it is not generally known that millions of dollars are still needlessly wasted annually by the American home owner and by the housewife in overcoming the effects of hard water. The time is not far distant when every community having a population of 10,000 or over, located in hard-water districts, will operate its own water-softening plant to eliminate this waste. This is another instance illustrating the social and economic importance of lime. I could go on indefinitely citing additional uses equally important, but will mention just one other.

Lime manufacturers of the United States received this tribute to their industry as they sat about the banquet tables in the Edgewater Beach Hotel, Chicago, Ill., on the evening of June 3, at the annual convention of the Association. They were not the only persons privileged to hear it, however. The address was broadcast on a nation-wide scale over the network of the National Broadcasting Co. and associated radio stations, and was sponsored by the Westinghouse Electric & Manufacturing Co., as a salute to the lime industry.

We hear considerable about farm relief and the agricultural problem. It is a fact though, that, in almost every rural community, a small percentage of farmers have prospered and are now prospering in their chosen vocation. Study these men carefully and you will find them keen students of their business. They do not employ "hit or miss' methods—they follow the same fundamental principle which guides all successful manufacturers—they lower their cost of production. Almost without exception, soil liming is an indispensable part of their program. But one does not have to be a farmer to profit by the beneficial effects of lime on the soil; in all probability that much admired lawn or garden, right in your own neighborhood, has received its application of lime whenever needed.

Because the accomplishments so far attained in this industry are so vitally important to all, I take this opportunity to acquaint you with the efforts which are being made by the progressive lime manufacturers to serve you better.

The National Lime Association is organized for the purpose of encouraging a better appreciation of the value of lime in all its uses. As stated before, lime is used in the production of practically all of our everyday commodities, consequently new problems pertaining to its true place in industry, construction and agriculture are constantly arising. For this reason the Association maintains a staff of highly-trained technical men; construction engineers, chemical engineers and agricultural experts, capable of coping with these many and diversified problems. It is only by establishing fundamental facts about lime that we can increase the value of the industry to you.

This organization is ceaselessly at work making researches, conducting laboratory and field investigations, to the end that lime may be improved, and that the best methods of using it may be made known to everyone.

Designs Plant to Handle Aggregates for Building World's Highest Dam

Government Project in Eastern Oregon Will Require Three Years to Complete

By WALT STEPHENS

OUT in the sage brush of eastern Oregon, close to the Idaho line, Uncle Sam has started to build another irrigation dam, to be the highest in the world when completed. It will back up the Owyhee River for 60 miles and irrigate more than 200,000 acres of land.

Beginning some time this spring the placing of concrete will proceed uninterruptedly for about three years when it is expected the dam will be completed. The entire contract for the work is being executed by the General Construction Co. of Seattle, which, very early in the game, decided that the first requisite for success was an adequate and reliable gravel-washing and cement-handling plant.

The coffer dam to keep the river back while construction work is going forward had to be carefully built to take care of possible flood conditions in the river at spring time. A concrete wall was built extending down about 100 ft. below the river bottom. Marion steam shovels built up high banks of earth on each side of this wall. Earth was taken from the river bed partly because the river bed had to be cleared out, and partly because there was no other source of supply, most of the nearby terrain being solid rock. Earth was scooped up, loaded onto dump cars and carried away by Plymouth locomotives, hauling two cars per trip. Two electrically-operated Byron-Jackson, No. 3-A Deepwell pumps, each direct-connected to a 75-hp. General Electric induction motor, were used to dewater the site. The pumps were suspended on cables which are stretched across the canyon, and were raised and lowered by means of a winch located on the platform where the pump was mounted. General Electric magnetic control was used to start and stop the pumps, push-button stations being placed on the platform where the pump attendant was stationed. This made it unnecessary to mount heavy starting equipment on the platform which had to be raised and lowered to meet the water conditions encountered. The two pumps together handled almost 5,000 g.p.m.

The actual pouring of the concrete will be by means of a Lidgerwood aerial cableway with a 3-in. cable. The head tower of this cableway containing the winding drums and a 400-hp. motor is mounted on six parallel curved rails to allow for changing the position of the bucket so as to reach all parts of the dam structure. The bucket will be loaded from a special 10-cu. yd. standard-gauge car built by Norris K. Davis Co. of San Francisco, these special cars being hauled from the mixers by light gasoline-driven locomotives of the Plymouth type.

The government furnishes the gravel at the pit and the cement in bulk at the dam-site. The gravel pit is located some 30 miles from the dam-site, and it was necessary for the contractor to build a standard-gauge railway from Dunaway, on the main line of the Oregon-Washington and Navigation Railway, over sage-brush plains and hills 33 miles to the dam-site. The latter is more than 40 miles from the nearest railroad station by rail, and further than that by a new and very rough road over the sage-brush hills with not a suggestion of a habitation in the entire distance.

Because of this isolation, the contractors have taken greater precaution, perhaps, than usual in selecting a plant and equipment that promises the greatest immunity from breakdowns and shutdowns. As a result, a gravel-handling plant has been designed and is under construction that, although it is of a temporary nature, will stand the scrutiny of experts in comparison with plants of the same capacity anywhere, whether temporary or permanent.

The H. W. Sharp Co., agents for Dodge Manufacturing Co. at Portland, Ore., contracted to furnish the entire mechanical equipment for the gravel-handling plant, and they are furnishing also the full plans and specifications on which the plant is being erected. In fact, it was due largely to the preliminary plans submitted by the H. W. Sharp Co. that it was awarded the machinery contract.

The nominal capacity of the plant has been calculated at 1,200 cu.

The dam site. Water is diverted from natural channel through 20-ft. tunnel. Shovels are clearing for foundation.

Pumps suspended from cables unwater channel at dam site.

yd. of sand and gravel per day of eight hours and 16 cars of bulk cement in the same time. The capacity will undoubtedly be stretched to more than these figures at times, but the design throughout will easily stand the increase.

Although the General Construction Co. expects to scrap the entire plant at the end of its three-year run, the officials wisely decided to equip the plant throughout with Dodge-Timken roller bearings. The saving of power alone is expected to amount to 40 per cent over plain, babbitted bearings, but greater savings are expected in both labor and material for lubricating the hundreds of bearings, and in the absence of shutdowns for re-babbitting, replacements and repairs.

All of the transmission and conveying machinery will be supplied by Dodge, while the stone crusher, screens, gates, spouts, and apron feeders will be furnished by the Balzer Machinery Co. of Portland, Ore. All motors will be 440-volt, 60-cycle, 3-phase General Electric—mostly 900 r.p.m.

The pit gravel will be brought to the track hopper in 40-cu. yd. center-dump cars. The track hopper is 18 ft. square, and has a capacity of one carload. The pit over which the hopper is built is 14 ft. deep, the space below the hopper being occupied by the apron feeder and the tail end of a 36-in. belt conveyor.

This conveyor is known as unit No. 1. It will operate at 250-ft. per min., taking the gravel from the track hopper up a 15-deg. incline to discharge into the scalping screen. To conform with the local conditions and topography, it was necessary to bring unit No. 1 up to the scalping screen at an angle of 60 deg. with the center-line of the remainder of the plant. The belt runs on Dodge-Timken troughing rolls placed at 4-ft. centers, with Dodge-Timken return rolls at 10-ft. or 12-ft. centers. The belt is a Republic Rubber 36-in., 5-ply rubber-covered belt, of 32-oz. canvas duck, with 1/18-in. top covering and 1/16-in. covering on the back.

The scalping is done on a 48-in. by 10-ft. cylindrical screen with 8-in. square openings. The material going through the perforations drops into a hopper just large enough automatically to control pulsations in the flow of material from No. 1, due to irregularities in dumping cars into the track hopper. The oversize from the scalping screen drops into the jaws of a 15-in. by 38-in. wheeling jaw crusher, the shaft of which is mounted on

Discharge portal of diversion tunnel, ¾-mile long in solid rock.

Camp of the General Construction Co. at site of the Owyhee dam.

Timken bearings. The discharge from the crusher falls directly onto the belt of unit No. 2.

From the hopper under the screen the material is taken by an apron feeder and fed onto the belt of No. 2. The latter is a 30-in. belt running at 300 ft. per min. up a 16-deg. incline. It is provided with Dodge-Timken troughing rolls placed at 4½-ft. centers. The return rolls are Dodge-Timken 30-in. return rolls placed at 10-ft. to 12-ft. centers. The belt is a Republic Rubber Co. 30-in. belt of the same construction as in unit No. 1.

Unit No. 2 discharges at a height of 71 ft. above ground level, into two 42-in. by 18-ft. cylindrical screens, each with two jackets. Either screen has about the necessary capacity to handle the entire run of material from No. 2 conveyor; but, partly as a safeguard against shutdowns and partly because of possible increase in capacity wanted, it was decided to use the twin-screen arrangement.

Washing is accomplished by a stream of water under high pressure in a 4-in. pipe introduced into the hopper between the conveyor discharge pulley and the screens, as well as in the screens themselves by means of a perforated pipe. The overflow carrying the sand is chuted down into the sand washer. This washer is of the flight-conveyor type, with two strands of chain and flights every 16 in. The flights stir up the sand to allow all foreign material to loosen and to flow off with the overflow. Eventually the flights carry the clean sand out over the discharge end whence it drops into storage. Plans call for mounting the washer at this plant with 1½-in. rods with long-threaded ends so that the discharge end may be raised or lowered slightly to suit the requirements of quantity and quality of sand. Excess sand may be disposed of by opening the overflow gate enough to let it flow off with the water. The overflow water is flumed to the river several hundred feet away. Not less than 250 gal. of water per minute will be provided for each screen.

The government requirements called for five classifications of sand and gravel, and storage space was calculated on data furnished by government engineers as to the probable run of the various sizes in the pit. The data were based on a great many samples taken from all parts of the pit.

The distribution of the various classifications as they come from the screens is one of the most unusual features of this plant and one which should be of interest to other designing engineers.

Channel of river below dam site; coffer dam in background.

Cutting keyway in cliff at one end of proposed dam structure.

The sand, as noted, washes down into the washer from the sand jackets of the screens. The largest size of rock—3-in. to 8-in.—is allowed to fall straight down to its storage space. Each of the three sizes between sand and large rock, viz., 3/16-in. to ¾-in., ¾-in. to 1½-in., and 1½-in. to 3-in. is carried to its respective storage section by its own 20-in. belt conveyor. These three belt conveyors are arranged in a tier one above the other and are driven by one 10-hp. motor. These three conveyors are known as No. 5, No. 6, and No. 7.

No. 3 conveyor is the recovery conveyor. It is located under the storage, in a tunnel 7 ft. high by 9 ft. wide, and is about 200 ft. long. The material is fed to No. 3 by 14-in. by 16-in. bin gates for the sand and gravel, and by 16-in. by 20-in. gates for the large rock. The belt on No. 3 is a 30-in. Republic rubber belt made to the same specifications as the other large belts. Dodge-Timken troughing rolls are spaced to suit the positions of gates, but never more than 5 ft. apart. The Dodge-Timken return rolls are at 10-ft. to 12-ft. spacing. This conveyor runs at a speed of 275 ft. per min.

While the speed of No. 3 is less than that of No. 2, its capacity will be somewhat greater since the feed will be continuous at full capacity from the bin gates, whereas the feed on No. 2 will be intermittent due somewhat to the dumping of cars on No. 1. There is storage space provided for about five or six days' run, but the contractor, having hopes of increasing his output over the 1,000 cu. yd. of concrete per day, wisely required a greater capacity of conveyors No. 3 and No. 4 which supply the batch hopper over the mixers. In other words, there shall be no bottle necks in this plant when added capacity is wanted.

No. 3 conveyor feeds directly onto No. 4 conveyor. This No. 4 is another 30-in. belt running at a speed of 285 ft. per min. on an incline of 15 deg. This is the longest conveyor in the plant, it being 332 ft. long. It discharges into a hopper equipped with a 14-in. by 16-in. revolving spout. This spout has a swinging radius of 9 ft., the lower end having a small wheel to run on a circular track made of bent angle. This allows the attendant to easily and quickly throw the discharge from the conveyor into the center of any bin.

There are six bins in the batch-hopper, so arranged that the mixers located below may receive material of any size, at the will of the mixer attendant. This hopper is probably unique in some respects and is a happy arrangement for this particular plant.

The belt on No. 4 is the same as on Nos. 2 and 3. The Dodge-Timken troughing rolls are set at 4½-ft. centers and the return rolls at 10-ft. to 12-ft. centers.

The drives on all the large conveyors—Nos. 1, 2 and 4—are alike in that they are driven by slow-speed motors through a countershaft with open gears, a pulley, and rubber belt from the motor. The head pulleys are of cast iron and lagged with rubber. The snub pulleys are so located as to give a wrap around the head pulley of 200 deg. or more. The belt is then carried over the automatic weighted take-up pulley and thence over an idler to its return course. By regulating the weight on the automatic take-up, the exact tension required for the load will always be maintained. The cast-iron gears on the head shafts are of extra proportions for the work, and are driven by cast-steel pinions on the countershafts. All the bearings on the head shafts, countershafts, tail-shafts, snub-shafts, take-up-shafts, and idler-shafts are Dodge-Timken ball and socket self-aligning pillow blocks.

The three 20-in. conveyors over the storage section used for distributing the various classifications of gravel are driven by a single 10-hp. motor. This motor drives the countershaft of the No. 5 conveyor by belt and the head pulley, in turn, through open pinion and gear. Snub pulleys and automatic take-ups are provided on all these conveyors the same as on the larger ones. No. 6 conveyor receives its driving power through an extra pulley on No. 5 so set between two idlers as to give the extra pulley a wrap of 180 deg. In the same way No. 7 conveyor is driven from No. 6 conveyor. Dodge-Timken troughing idlers on all three conveyors are set at 5-ft. spacing with return rolls at 12-ft. spacing.

The character of the country at the dam-site is very rocky, and it was not easy to select a location for the mixing plant. However, as much as pos-

sible was taken of the rocky contour. Most of conveyor No. 4 will rest on the side of a cliff. Also the back end of the batch bunker will set on solid rock. There was no other location for the cement bunkers except directly back of the batch bunker on a shelf blasted out of the cliff. The problem of handling the cement was not easy to determine.

The cement is delivered in bulk to the dam-site by the government in box-cars. These trains approach on a special track, in lots of from 10 to 20 cars each. Arrangements were provided to handle 16 cars per day from the cars to the cement bunkers. The cars are spotted alongside of a hopper at the foot of a bucket elevator. The cement is scraped out of the car, with mechanical shovels, into the hopper.

The cement-track hopper and the boot of the cement elevator are of concrete. The elevator is 86 ft. high. It is made up of two strands of Baldwin replacement roller chain with 14-in. by 8½-in. malleable buckets spaced about one foot apart. At a speed of 225 ft. per min., these buckets will take the material away as fast as it is unloaded and will discharge it well at the top. The tail shaft is mounted in two style B Dodge-Timken protected-screw take-ups which are mounted on the concrete wall of the boot but outside of the chamber where the buckets pick up the cement. A dust shield is provided for further protection to the bearings between the pick-up chamber and the bearings.

The head shaft and countershaft are mounted on Dodge-Timken ball and socket pillow blocks, the same as all other shafts on the job. The drive is from a 20-hp., 900-r.p.m. motor, through open gear and pinion, with belt from the motor to the countershaft.

The elevator discharges onto a 20-in. belt conveyor running on a rise of 15 deg. to the top of the cement bunker. The belt conveyor discharges into a chute arranged to discharge the cement into either half or both halves of the cement bunker. The belt conveyor is driven by a 3-hp. motor through belt and open gear and pinion on head-shaft and countershaft, with Dodge-Timken pillow blocks on all shafts, Dodge-Timken troughing rolls at 5-ft. centers, and Dodge-Timken return rolls at 12-ft. spacing. The tail-shaft is equipped with Dodge-Timken style B protected screw take-ups.

The final step in the flow of materials to the mixers is by screw conveyor, one from each hopper bottom in one side of the cement bunker. These conveyors have 12-in. screws operating at a speed of 90 r.p.m. and each is driven by a 5-hp. motor through a clutch on a countershaft. The motor is belted to the countershaft and, from the clutch to the screw, the drive is through Baldwin roller chain. Each screw conveyor is 32 ft. long.

One fundamental requirement put down by the General Construction Co. when this plant was first conceived was that it must run with a minimum of attendants. It was contended, and wisely so, that a little extra time and expense in the designing of the plant would give big returns in the cut-down of operating costs. The designers believe that no other plant of like capacity anywhere can accomplish more than this plant can with the same number of men.

There will be one or two men at the track hopper to dump and shift cars. There will be a man at the scalping screen and crusher. There will be one man handling the twin screws, the sand washer, and the distributing conveyors. One man will handle the gates in the recovery tunnel. One man will handle the discharge from conveyor No. 4 into six bins by means of the revolving spout on the circular track.

There are two Davis 4-cu. yd. mixers. In order to produce the required output, each of these mixers must load, mix, and dump every three minutes. Under government inspection and instruction, there must be one, two, or three classifications of gravel weighed into the hopper, together with sand, water, and cement; each weighed to within the government limits. All of this will be accomplished by one man at each mixer.

Five gravel and sand chutes lead into the hopper of a large scale over the mixer hopper. The gates on these chutes are of heavy cast steel to withstand hard use, and each is operated by an air cylinder. These air cylinders are controlled by a bank of levers in front of the operator. A quick throw of a lever lets a flood of rock or sand into the scale hopper until it shows a certain weight; another advances the scale pointer to its particular place.

Channel from river is diverted through tunnel.

Head-tower of aerial tramway mounted upon six rails.

The cement is weighed into a separate scale, a lever being provided to throw in and out the clutch that operates the screw conveyors. Water accumulates in a tank from which it is released at just the right time by another lever. The action must be fairly fast so the operator used both his hands and his feet and, it might be said, his eyes twice. Altogether, this plant is a splendid testimonial to the idea of designing a plant scientifically rather than of building it "from experience" in the field. Experience is the most valuable asset in building but it can be most profitably applied in the drafting room before construction starts.

Another interesting feature of the plant is the control of various units from different points. Nearly all of the motors that drive the conveyors are provided with remote-control start-and-stop buttons.

There will not be a regular oiler on the job, as Dodge-Timken bearings require lubricating only at long intervals.

All of the conveyor structures will be of timber. This is a timber country, and steel would be almost prohibitive even for a permanent plant. The troughing rolls and the return rolls are mounted on two 4-in. by 12-in. timbers, these being supported by 8-in. by 8-in. A frames or bents every 20 ft. Knee braces of 4-in. by 8-in. timber are run to the center of each span, and 3-in. by 10-in. cross-bracing is placed both ways between bents and on the bents themselves. The legs of each bent are surmounted by an 8-in. by 8-in. cross member on which the 4-in. by 12-in. conveyor timbers rest.

"Main street," Owyhee, temporary construction camp.

These cross members extend out to each side to provide a walk way.

In addition to this dam being the highest in the world, the Owyhee project has further points of interest. It will back the Owyhee River up about 60 miles. One of the main laterals for irrigating the surrounding country will have to be carried across the river some distance below the dam, and this crossing will be accomplished by a syphon having a 350-ft. head and about 3,000 ft. long. At another point, the main ditch will run through a 20-ft.-diam. tunnel through solid rock 3.3 miles long, while another main ditch on the other side of the dam will go through a similar tunnel 6.3 miles long. Each of these tunnels will be pretty fair projects by themselves as, in each case, it will be impossible to sink a shaft near the center. They will probably be worked by separate contracts from each end of the tunnels.

The dam-site is about 49 miles south of Nyassa, Ore. The first dozen miles is part of the Old Oregon Trail but the balance is an atrocious road recently cut through sage-brush. It is doubtful if even a stock trail ever ambled through this territory.

Indiana Manufacturer of Whetstones Conducts Thriving Business

A thriving business, in which members of the fourth generation of the family founding it are now engaged, is being conducted by the West Baden Whetstone Co., of West Baden, Ind.

This business, the manufacture of whetstones of every description, is owned by L. J. Chaillaux. His son, Lewis, assists in the management. Mr. Chaillaux owns a 1,000-acre deposit adjacent to the plant, from which most of the stone used is quarried. The stone is said to be of an unusually fine quality for whetstones.

The business was started by a Mr. Prentice in 1794. He made the stones at Hindostan Falls, Ind., near by, shipping them by flatboat to New Orleans for reshipment to England. In 1849, L. J. Chaillaux, father of the present owner, emigrated from France, and took over the business. In addition to whetstones he also made tombstones, a large number of which are still standing in some of the older cemeteries of southern Indiana.

The company now makes more whetstones than are made at any other quarry. Large shipments of the stone go to foreign countries. Before the war, Russia was the best customer. South American countries now buy the most stones. Sharpening stones are made for every purpose, from small penknife stones to large sand stones used in the manufacture of rubber tires. Stones for polishing the delicate mechanism in fine watches are made, as well as polishing stones used in the making of bulky machinery. Most of them, however, are used in supplying the farm trade.

The Effect of Fine Grinding and Water Content on Cement Strengths*

German Tests Indicate Fineness is Not Always a Requisite for High Strength

By DR. HANS KUEHL

THE addition of an accurately-measured quantity of water is an important requirement in testing cements. Experience in cement testing has taught that a slight variation in the water added has a marked effect on the strength tests. Although this fact has been known for a long time and observed in testing many different makes of cements, nevertheless, no one, up to the present time, has derived the exact mathematical relation between the water added and the strength obtained in testing the cement. The only definite conclusion that has been reached is that, when the amount of water added is greater than the "correct" proportion, the strength of the cement is quite generally impaired. The magnitude of this effect varies with one cement and another.

Two rather outstanding examples are given in Dr. Guttmann's article in *Tonindustrie Zeitung*, No. 22, 1928. Two Portland cements with almost the same strength properties were mixed with sand and gravel in the ratio of 1:3:3, and a fluid concrete containing 13 per cent water was obtained. Strength tests made on the concrete after 28 days gave a strength in compression of 160 kilograms for one cement and only 80 kilograms for the other! The conclusion was that this was due to the variation in the water added.

This phenomenon is one of the greatest practical significance to the cement man. It has been quite generally held that the method used for testing one form of hydraulic bonding agent is not applicable to another and that, for example, the method used in testing Portland cements or slag cements can not be correctly applied to testing other cements or the like. This is absolutely correct. The aforementioned difference in strength figures obtained in testing two concretes made from two cements of the same properties clearly proves this contention.

There is still another side to this particular matter. Guttmann's observation teaches us how risky it is to calculate strength characteristics from given figures on the same kind of bonding agent, that is, Portland cement. It has often been thought advisable to derive formulae which could be used for such a purpose, and the author must point out that this wish is fruitless, for it has been proven that they will yield results which are only approximately accurate. It is, of course, possible to study the mass of figures that are available on this subject and point out a certain relationship between the strength of cement and that of the concrete or mortar made from it, but this does not mean that a general rule can be established. There is always the possibility that there will be some marked variation, and this condition must remain extant so long as the exact mathematical relationship between the water added and the strength of the concrete is unknown. This is why the user of the cement is always more anxious to test the concrete that is made from it and not the cement itself to determine the exact strength obtained.

Variations in Strength

The author wishes again to emphasize the observation made by Guttmann, mentioned above, that two Portland cements of the same standard strength characteristics gave concretes whose strengths varied from one another by one hundred per cent. He has conceived the idea that there must have been something quite peculiar to these cements, as they were made, to produce such a variation. It is natural to conclude that the cause of this difference is to be found either in the fineness of the grinding of the cements or in their chemical composition. The author, accordingly, prepared a series of cements, which varied markedly in chemical composition and which were also differently ground, and studied the influence of the addition of water on the strength of these cements.

Four different portland cement clinkers were used in the experiments, one clinker having been burned in a shaft kiln and the other three in an ordinary rotary kiln. Table I gives the chemical analyses of these cements. It is clear from this table that the chemical compositions of the cement vary as much as possible. The hydraulic modulus varies from 1.97 to 2.38; the silicate modulus from 1.30 to 2.63; the iron modulus from 1.09 to 1.89. If

TABLE I—CHEMICAL ANALYSES OF FOUR CEMENTS

Clinker	Cement A	Cement B	Cement C	Cement D
Loss on ignition	0.64	0.43	0.35	0.42
Silica	19.53	22.97	19.76	18.69
Alumina	4.68	5.72	7.73	8.49
Iron oxide	4.29	3.03	5.42	5.93
Lime	67.90	65.27	64.95	65.21
Magnesia	2.13	2.13	1.28	1.12
Sulphur trioxide	0.57	0.42	0.38	0.20
Hydraulic modulus	2.38	2.06	1.97	1.97
Silicate modulus	2.18	2.63	1.50	1.30
Iron modulus	1.09	1.89	1.43	1.43

*Translated from an address delivered at the 1929 meeting of the Society of German Portland Cement Manufacturers in Dresden, Germany.

the chemical composition of the cement has any influence at all on the water factor, then it is to be expected that the investigation of such differently-composed cements will yield some information on the relation between strength, water content and composition.

Six different cements of varying degrees of fineness were prepared from each clinker, making 24 different cements in all, in order to determine the effect of the size of the particles. The author ground the clinkers in his laboratory grinder, using 20 kg. of the clinker in each test. The coarsest grinding lasted for 2.33 hours and the finest grinding was obtained after fourteen hours. The cements were also ground 3.33, 5, 7 and 10 hours.

The 24 different cements, prepared from the four clinkers, were tested in three different states of dryness, one slightly moistened (earth-moist), two plastic and three wet. Thus, 72 different tests were made. Tensile and compression strength was determined for each five individual samples after three days, after seven days and after 28 days under water and also stored under water and in air (combined storage).

The author used a standard sand in these experiments. He realized that working with a wet mortar made from such sand and cement is contrary to the rules of practice. The preparation of a wet mortar actually requires a mixed, granular sand. The reason for using the standard sand was to make momentarily visible the influence of the large addition of water. This was the most important consideration in the tests, and not the development of a testing process for wet mortars. It was found much easier to render clearly visible the effect of the water by the use of standard sand rather than a mixed sand.

Preparation of Samples

The samples were made according to the standard method. The standard amount of water required for each cement was determined and each cement was also mixed with this quantity of water. Plastic mortar samples were obtained by increasing the water added by about 40 per cent over the standard, and the amount of water added was increased by about 70 per cent over the normal to obtain a wet mortar. Thus, for example, if the water requirement of the cement was eight per cent, then 11.2 per cent of water was used to make the plastic sample and 13.6 per cent to make the wet sample.

The hammer apparatus was used for making the earth-moist sample, while a hand stamp was used in preparing the plastic and wet mortar samples. From the intrinsic characteristics of the samples, it was natural to find that the accuracy of the strength tests was considerably greater in the case of the earth-moist samples than in the plastic and wet mortars. The differences in the strength tests in these three cases was always so marked that the variation in the individual values, which was due to the methods of preparation of the earth-moist and the plastic samples, could not have any essential influence on the final results obtained in this research.

In establishing the net results from this work, it was found first quite interesting to follow through the manner in which the different cements behaved in grinding in the ball mill. Although the cements are differently constituted, and although they were prepared from clinker manufactured not only in the rotary kiln but also in one instance in the shaft kiln, the general course of the grinding process was not much different. However, when the grinding process was prolonged, some differences set in. These differences did not apparently follow any law. Thus the cement, for example, which gave the largest screen residue after the first grinding period, became the finest ground after the third grinding period, that is five hours, and in fact remained the finest ground after the last period. This was cement B, which contained a particularly high percentage of silica. It is particularly striking that cement A, which is the one obtained from the shaft kiln clinker, was the one which gave the greatest screen residue in almost each stage of the grinding process. It is evident from this that the old assumption to the effect that clinker produced in the shaft kiln is more easily ground than clinker produced in the rotary kiln does not hold good in all cases and that the conditions can be just the reverse when the clinkers are ground in a laboratory grinder. The author has often found it more difficult to grind shaft-kiln burned clinker in laboratory grinders than rotary kiln clinkers. He believes that this must be assigned to the fact that the rotary kiln clinker is somewhat harder, but also somewhat more brittle than the shaft kiln clinker. The brittleness of the material appears to be a determinative factor as far as the laboratory grinding process is concerned.

Time of Setting

All the cements were found to be slow setting when the coarser portion was tested. It was only when the grinding period reached ten hours that the time of setting was appreciably reduced in two cements. Three of the four cements were still slow setters after 14 hours of grinding. The fourth cement was converted into a rapid setting cement at the end of the 14 hours of grinding. It is noteworthy that this particular cement still set slowly after being ground for ten hours. A sudden reduction in the time of setting was accordingly caused by the finer grinding. This is a phenomenon which the author observed some years ago. In 1917 he published an article in Tonindustrie Zeitung on grinding experiments, in which he established that a cement with 15.4 per cent screen residue still had an initial set of three and one half hours and that its time of initial set was reduced to seven minutes when it was ground to give a screen residue of 10.5 per cent.

This noteworthy phenomenon, namely, that a cement suddenly changes very markedly in setting

time, when its fineness of grinding oversteps a certain limit, affords the author an opportunity to mention the investigation, carried out at his instigation by Dr. Brans. This investigator prepared gypsum in various degrees of fineness and studied the influence of the fineness of the gypsum on the time of setting of portland cements to which it was added. It was first naturally found that finely-ground gypsum is much more active than coarsely-ground gypsum, which is naturally understandable. Dr. Brans established, however, the highly important fact that there is a "swelling or hydration"

TABLE 2. INFLUENCE OF GYPSUM ON THE INITIAL SET OF PORTLAND CEMENT

	Degree of Grinding of Gypsum							
	Very Coarse		Coarse		Moderately Fine		Fine	
Gypsum added (*per cent*)	21.5	25.8	17.2	19.4	10.8	11.8	2.7	3.8
Initial set (*minutes*)	5	400	6	300	4	210	5	118

value for every fineness of gypsum, below which the gypsum has not considerable influence on the time of setting. Tables 2 and 3 give some figures, taken from Dr. Brans' article on this very interesting matter.

TABLE 3. INFLUENCE OF GYPSUM ON THE FINAL SET OF PORTLAND CEMENT

	Degree of Grinding of Gypsum							
	Very Coarse		Coarse		Moderately Fine		Fine	
Gypsum added (*per cent*)	12.9	14.0	10.2	10.8	4.8	5.3	1.6	2.2
Time of set (*minutes*)	20	135	25	210	15	138	25	190

It is first evident that the quantity of gypsum that must be added to a portland cement in order to make one that is rapid-setting is very considerable when the gypsum is coarse. The proportion of added gypsum rises to 25.8 per cent in the case of the most coarsely-ground product. The sudden change that takes place and is noticeable in the initial set of the cement when a certain swelling value is overstepped, is much more interesting. While the addition of even 21.5 per cent of the most coarsely-ground gypsum has almost no effect

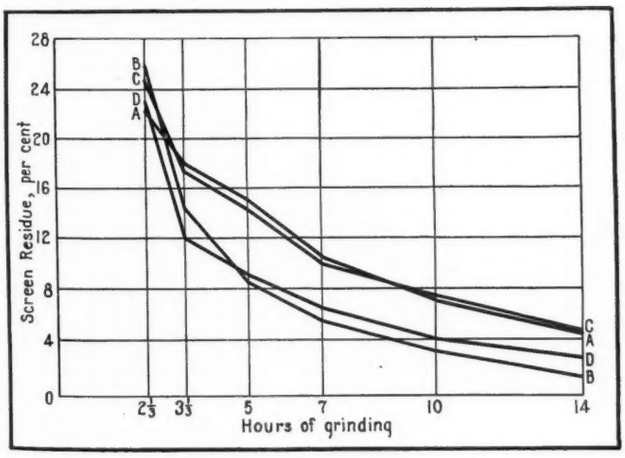


Fig. 1. Curves showing course of grinding.

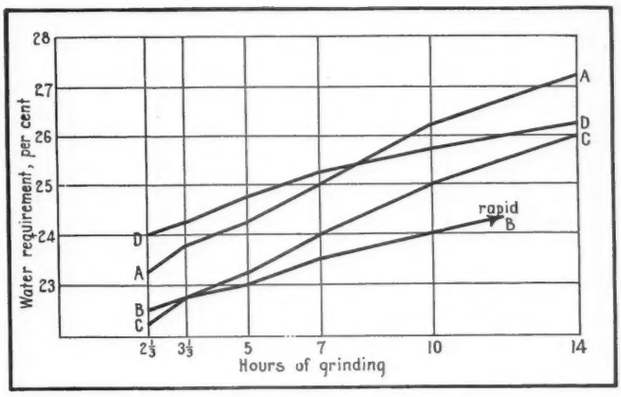


Fig. 2. Curves showing water requirements.

on the time of initial set, the initial set rises to 400 minutes or almost seven hours when the proportion of gypsum added is increased to 25.8 per cent. Conditions are entirely different in the case of the more finely ground gypsums, although the absolute proportion of gypsum is naturally less in this instance. The addition of gypsum does not have so marked an effect on the initial set of the cement as on the final set, although here again a "swelling" value is clearly recognizable for each fineness of grinding of the gypsum.

The author does not desire to go into a discussion of the theoretical significance of the sudden change in the activity of the gypsum and hence wishes to refer the reader, who is interested, to his address before the general meeting of the Association of German Portland Cement Manufacturers held in 1922 on "The Hydraulic Hardening as a Colloidal-Chemical Problem." It suffices his purpose here merely to call attention to this extraordinarily interesting parallelism between the sudden effectiveness of grinding on the time of setting and the similar phenomenon encountered on the addition of gypsum to the cement. It is apparent that a fundamental relation exists here and of such a nature that it is a surface action in each case, which causes the sudden change in the time of setting.

Water Requirements

The author now returns to further consideration of the fineness of the grinding of cement and to study this in connection with the water requirements of the 24 experimental cements that he is examining. The water requirements of all four cements increases as the degree of fineness increases. However, there is no strong case of parallelism between the two factors. The relation between these factors becomes, however, much clearer when the results are plotted in curve form. This may be seen from Figs. 1 and 2. It is easily seen from the grinding curves as well as from the water requirement curves that the cements may be grouped into two classes.

Thus, it is evident from Fig. 1 containing screen-residue curves that the curves A and C on the one hand, and the curves B and D on the other hand, run very much alike. The author has not been able to establish just why these cements should

group themselves as far as a degree of grinding is concerned in just this manner. As far as the chemical composition of the cements is concerned, it is clear that cement A should be grouped with cement B, and cement C with cement D.

It is interesting to note that the grouping of the cements according to the degree of grinding corresponds to the grouping according to the water requirements. This is seen from Fig. 2, wherein two water requirement curves rise comparatively steeply, namely curves A and C, while the other two curves are comparatively flat, but here again they run quite parallel to one another, namely curves B and D. It is also found that the more difficultly pulverizable cements C and A have a comparatively greater water requirement, as the degree of fineness increases, than the more easily pulverizable cements B and D, in which instances the water requirement curves are comparatively flat. This fact allows the clear deduction of a relation between the fineness of grinding and the water requirement of a cement. This is quite a parallelism between the degree of fineness and the required addition of water to the cement. This is a practical conclusion which agrees very well with theory, and the author need not go into this matter any more at this time.

The figures that were obtained in testing the 72 different cement mortars are so numerous that they cannot be given here. The author had to limit himself to selecting the most important of these. The results given in Table 5 pertain to the standard testing of the best cement, which he prepared from the four different types of clinker mentioned above.

TABLE 4

	Cement A	Cement B	Cement C	Cement D
Hydraulic modulus	2.38	2.06	1.97	1.97
Time of grinding (*hours*)	7	7	10	10
Residue on 4900 mesh screen (*per cent*)	10.4	5.4	7.4	4.1
Standard test	stable	stable	stable	stable
Cooking test	fissured	stable	stable	stable
Normal consistency (*per cent*)	25	25.5	25	25.75
Initial set (*hours*)	1.75	1	1	0.5
Final set (*hours*)	4	4.5	3.75	2.25
Tensile strength 1:3				
Three days in water	17.4	29.4	31.5	26.6
Seven days in water	17.4	30.4	33.8	25.4
28 days in water	23.4	32.1	35.6	31.0
28 days combined storage	33.8	42.0	41.4	35.4
Compression strength 1:3				
Three days in water	293	295	364	260
Seven days in water	338	369	424	301
28 days in water	358	429	548	405
28 days combined storage	402	503	614	520
Evaluation coefficient	2,311	2,935	3,373	2,670

It is seen from Table 4 that clinkers A and B had to be ground seven hours, while clinkers C and D had to be ground ten hours, in order to obtain the best results. As far as the individual strength figures are concerned, it is evident that all four cements gave high compression strength figures after the end of three days. Cement A does not maintain its standard in the tensile strength tests. This is apparently due to the fact that the cement was not stable in the boiling or cooking test. The author will not go into details as far as the individual results are concerned, but desires to call attention to the figures on "evaluation coefficient." These are obtained by taking the tensile strength figures, first multiplying them by 10 and then adding all the tensile and compression strength figures. Thus the figure 2,311 is obtained from the eight strength figures in the same column.

Evaluation Coefficients

There may be a certain amount of hesitation in working with the evaluation coefficients, because they do not express the specific properties of a cement. Thus, for example, a cement with a high strength in compression but with a comparatively low tensile strength may give a better evaluation coefficient than a cement whose tensile and compression strengths are both good. In spite of this

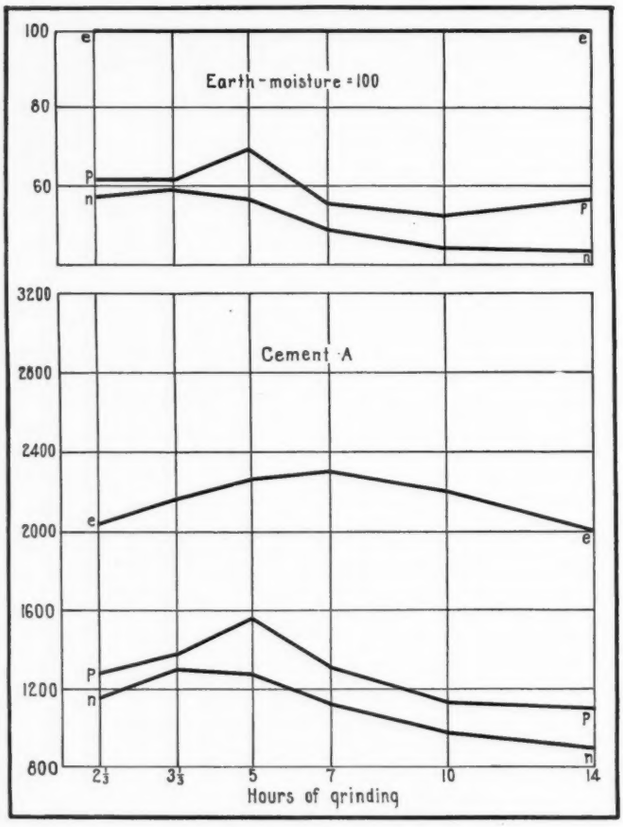


Fig. 3. Strength curves of Cement A.

the author believes that the evaluation coefficient is a valuable aid in obtaining a certain conception of the value of a cement from a great mass of experimental testing data. * * *

A closer examination of the evaluation coefficients of the various cements reveals the fact that the finest ground cements never have the highest evaluation coefficients. These are found in the average fine ground cements, and also in the case where the cement mortar was made earth-moist and ground for seven to ten hours. Further grinding actually reduces the evaluation coefficient to an appreciable degree.

The figures given in Table 4 also show that a large water content in the cement mixtures reduces the strength of the cement, and particularly so in

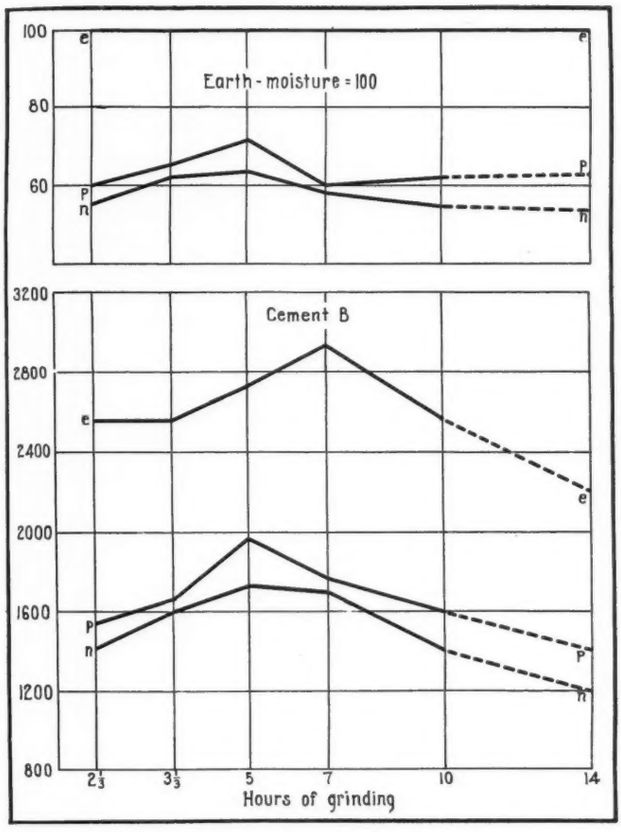


Fig. 4. Strength curves of Cement B.

going over from the earth-moist to the plastic samples, but less in passing from the plastic to the wet samples. It was also found, which is particularly noteworthy, that not only is the strength of the cement reduced under these conditions, but the quality of the cement is changed, inasmuch as maximum strength approaches more the coarser grinding, the greater the addition of water. This is a highly important fact, for it has been generally believed that a finely ground cement is better suited for wet working than a coarser ground cement. The author has found that his conclusion has been substantiated in all the experiments that he has made and he therefore feels that he cannot be in error. * * *

The much more important conclusion deducted from this tabulation is concerned with the magnitude of the change in the strength of the cement as the water content of the mixture increases. In the most favorable case the strength of the cement decreases from 100 to 72 units in the change from earth-moist to plastic condition, and in the most unfavorable case from 100 to 52 units. The decrease in strength of the cement is still greater in the change from the earth-moist to the wet state. In this instance the most favorable example shows a reduction from 100 to 66 units and the most unfavorable from 100 to 42 units. Expressed in other words, this actually means that when the same cement is used the strength in wet working is decreased in one case more than fifty per cent over that in earth-moist working. It is also highly significant that those cements which suffer the least change in strength when tested in the earth-moist, and the wet states are the ones that are ground to average fineness only, while the cements that are most finely ground undergo the greatest reductions in strength.

Water and Grinding Relations

The relation between the strength characteristics of the cements, their degrees of fineness and the water contents of the testing mixtures is shown in a series of curves in Figs. 3 to 6 inclusive. The net conclusion that can be derived from them is that a relation exists between the course of the grinding curves and the water requirements of the cements, which affords a practical substantiation of the theoretical assumption, namely that the water requirements for standard consistency in the case of well burnt and freshly ground portland cements must increase in parallel with the degree of fineness independently of the chemical composition of the cements.

The investigation on the strength characteristics of the cements did not afford any indication of the influence of the technical composition on the ratio between strength and the water content. On the other hand in all four types of cement there was clear evidence of a connection between the change in strength with increasing water content of the cement mixture, and the degrees of fineness of grinding. This connection was of such a nature that the maximum strength figures were not ob-

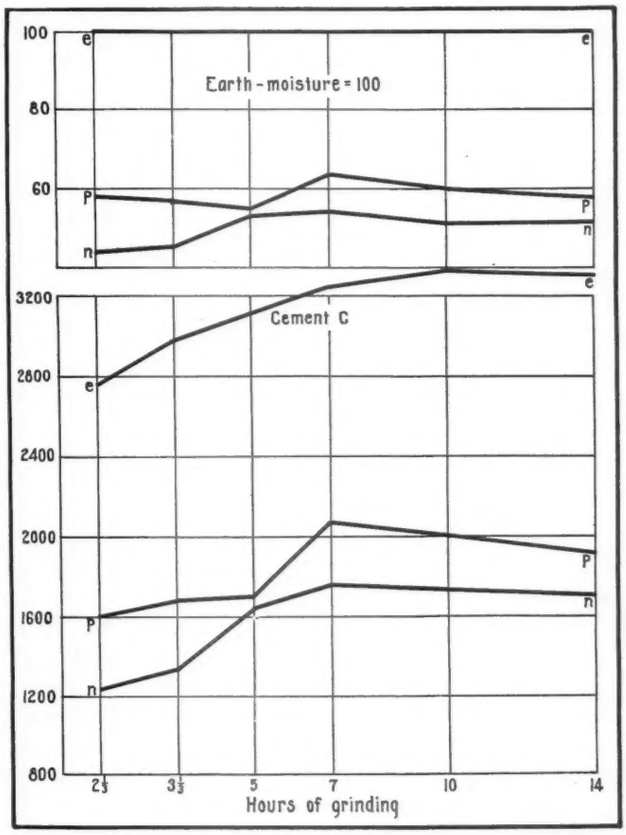


Fig. 5. Strength curves of Cement C.

tained at the state of finest grinding in all the tests made, but when the cements were in a state of average fine grinding.

Furthermore, it was shown that the reduction of the strength with increasing addition of water was less in the state of coarser grinding than in the case of finer grinding, and finally, that the absolute magnitude of the decrease in strength varied within very wide limits, so that the strength figures, based on the strength in the earth-moist state, varied from one another by fifty per cent in the case of wet testing of the cement. If this difference is not as large as what was obtained by Guttmann in the extreme cases of his tests on concretes, nevertheless, it approximates the latter, and it appears as if the question, that was asked by Guttmann as to the reason why cements, which possess the same normal strength properties, can give concretes which vary widely in strength when worked up in the wet way, must be answered in that this difference has its cause in the size of the particles of the cement.

As paradoxical as this statement may first appear, particularly inasmuch as not the finest ground cement but the coarser ground cement stand better the addition of large amounts of water, nevertheless it is a fact that this statement, when more closely studied, is seen to agree very well with the theoretical assumptions that we must make regarding the mechanism of setting. If we assume, as does Michaelis, that a gel substance is formed first from the finest portions of the cement and from the water that is added to make up the mixture, and that this gel mass attains a state of congelation due to "internal suction," then it is seen that the functions, which fall to the fine portion of the cement and to the coarse portion, differ from one another to quite a considerable degree. The finest portion of the cement is the one that yields the gel mass for the most part while it is the task of the coarser particles in the cement to take up the water due to their hydration which becomes more and more pronounced, taking this water from the loosely constituted gel mass as it is first formed, and thus bringing about the hardening of the cement mass.

Now, if one and the same cement is worked up with different quantities of water, then the proportion of the part of the cement, which has the power of reacting, will be almost the same during a definite space of time. This is a fact, for the reason that this phenomenon depends only on the magnitude of the contact surface between the cement and the water, and this area of surface contact remains unchanged when the amount of water added to the cement is increased. The result then is that a gel is formed which is constantly increasing in water content and also becoming softer and softer, as larger amounts of water are added. Inasmuch as the same quantity of coarse constituents of the cement must always be available for the phenomenon of "internal suction," then the addition of larger amounts of water must not only have

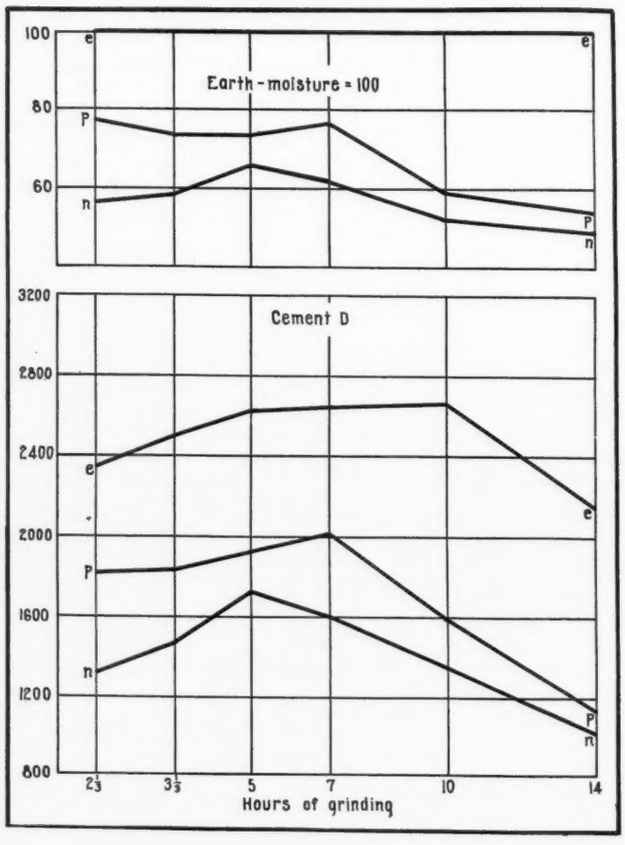


Fig. 6. Strength curves of Cement D.

a deleterious action on the process of hardening, but this action must also be manifested to a greater degree, the smaller the proportion of coarser constituents in the cement, which has to carry out the phenomenon of "internal suction" and therewith cause the hardening of the cement.

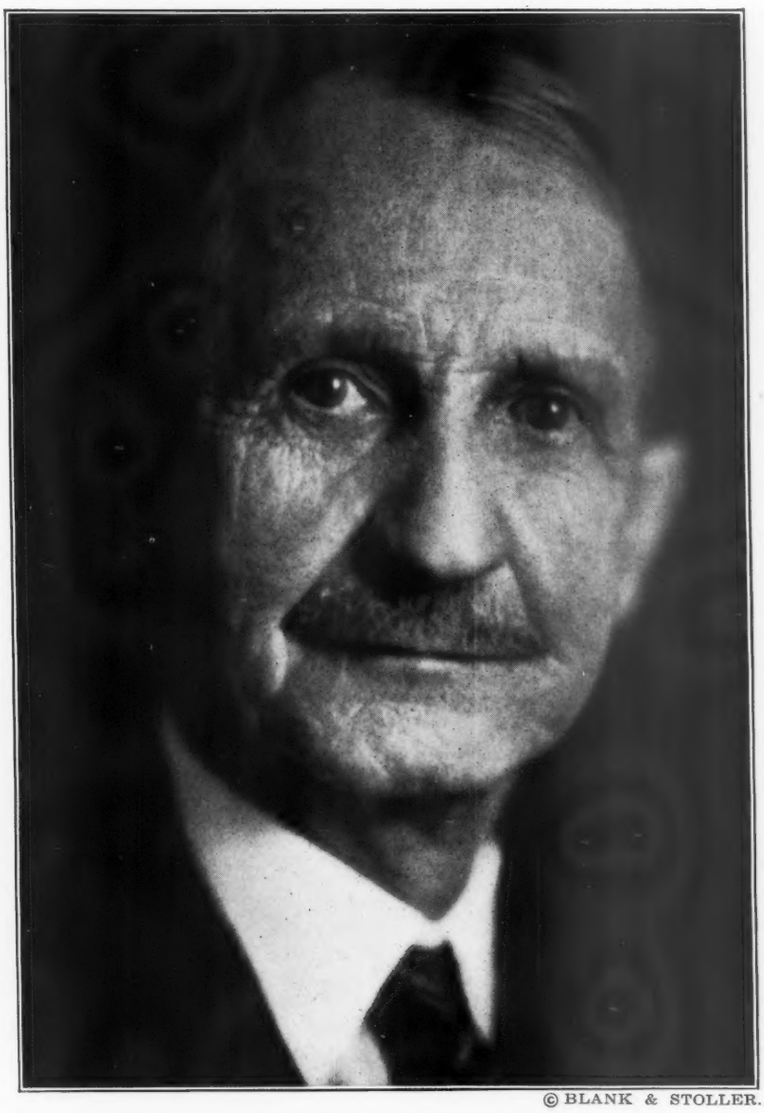
Hence it is always an incorrect conclusion, although one which is often believed to be true, that a cement develops its best strength, the more finely it is ground. Years ago Hausenschild showed that in no case under his observation did the finest ingredients of the cement give by themselves the maximum strength. The author might now extend the effectiveness of this statement by saying that the fineness of the grinding does not determine which cement is most valuable for a given technical purpose but much rather the correctness of the grinding. It appears as if there is a definite law relating to the size of the particle of the cement just like the one that Fuller and Graf have found to apply to the size of particle of concrete. The formulation of this law must be left to future experimentation and research.

Talc Sales in 1929 Show Increase of Eight Per Cent Over 1928

The total quantity of talc sold by producers in the United States in 1929 was 219,144 short tons, valued at $2,617,756. As compared with 1928 these figures represent an increase in quantity of 8 per cent, and in value of 3 per cent.

MEN OF THE INDUSTRY

The portrait printed on this page in each number of PIT AND QUARRY is selected without significance as to current events or the position of the individual in the industry.



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WILLIAM FLAHERTY

President,
Hoosac Valley Lime Co., Inc.
Adams, Mass.

Personal Mention

Charles Denman, chief chemist at the Bellevue, Mich., plant of the Alpha Portland Cement Co., recently underwent an operation at a Battle Creek, Mich., hospital. He is reported to be much improved. In addition to his duties at the Alpha plant, Mr. Denman is the esteemed leader of the Kellogg band of Battle Creek.

Robert W. Leep, for some years a member of the engineering staff of the Eastern Oregon Light & Power Co., Baker, has resigned to accept the position of county engineer of Baker County, Ore.

N. B. Garver of Little Rock, Ark., was elected president of the Mid-South section of the American Society of Civil Engineers at the closing session of the first annual convention held at Little Rock, May 15.

Lorenzo Albre of Dorchester, Mass., has announced the organization of the Albre Marble & Tile Co., Inc. Temporary offices are being maintained at Dorchester and a plant is to be constructed shortly. Mr. Albre was formerly associated with the Liberty Marble & Tile Co., and the Freeport Marble & Tile Co., having been instrumental in the formation of both companies, although he is not now connected with either.

Robert Arnduff and **O. H. Schooler** of Portland, Ore., have acquired lime deposits near Northport, Wash., which they plan to develop this summer.

M. E. Brian has been elected vice-president of the Caldwell Sand & Gravel Co., of Windsor, Ontario, Can. Mr. Brian resigned his post as city engineer of Windsor to devote his time to the activities of the company.

James F. Byrne, sand-and-gravel plant operator at Plasterville, N. Y., is installing new machinery, including new washing and crushing equipment.

Howard Reynolds and **Cornelius Buekema** of Lansing, Mich., have entered the industry and have acquired deposits near that city and plan to produce sand, gravel and crushed stone shortly in a plant to be constructed.

H. E. Pease of Sun Prairie, Wis., has purchased the municipal stone quarry of that city for $75,000, it is reported.

I. E. Martin of Guttenberg, Ia., has leased his quarry to **F. J. Saeugling** of Guttenberg and **C. J. Kipper** of North Buena Vista, Ia., the lessees having taken over the operation and will supply 30,000 cu. yd. of crushed rock to the government for river improvements.

J. Frank Davidson

J. Frank Davidson has been elected to the position of vice-president and assistant general manager of the Jeffrey Manufacturing Co. Mr. Davidson has been associated with the company since 1911. Prior to his election to the vice-presidency he held the position of assistant general manager, having previously served as purchasing agent in charge of purchases and stores. In addition to his position with the Jeffrey Manufacturing Co., Mr. Davidson is a director of the Ohio Malleable Iron Co.

E. A. Doyle, consulting engineer of The Linde Air Products Co., was elected president of the American Welding Society at the annual meeting of the society held April 25, 1930.

A. N. Thomas, formerly in the purchasing department of The H. K. Ferguson Co., recently joined in a business partnership with J. Y. Riffe of W. A. Ross & Co., mechanical engineers at Charleston, W. Va. The new firm is incorporated under the name of Riffe & Thomas, Inc.

W. E. Wells, for many years known as a leader in the pottery industry, recently announced his retirement from his active position as secretary-treasurer of the Homer Laughlin China Co., Newell, W. Va. His son, J. M. Wells, succeeds him as secretary and also becomes general manager of the company. Besides directing the activities of the Homer Laughlin China Co., Wells was an expert on tariff and for 25 years served at United States Potters' Association as chairman of the labor board. His son also succeeds him in this connection.

Luther G. Randolph, Ann Arbor, Mich., is building a cement products plant with a capacity of 3,000 units of concrete and cinder blocks daily.

Philip Godley, Philadelphia, Pa., will spend $100,000 in developing mica and kaolin deposits in Jackson County, N. C., it is reported.

Harold F. Kneen has been advanced to plant superintendent of the Lincoln Electric Co. of Cleveland, O., manufacturers of motors and welders. Mr. Kneen came to the company as assistant plant superintendent in June, 1929. Previous to that time he has held positions with the Indiana Flooring Co. as superintendent of their Ironton, O., plant and as heat-transfer engineer for the Ingersoll Rand Co.

John H. Coghlan has been appointed direct representative in the New England states for the sale of Amsco Manganese Steel castings, succeeding Harrington, Robinson & Co. of South Boston.

John L. King, Knoxville, Tenn., formerly with General Motors Truck Sales Co. of Knoxville, is now representing The Heil Co. in Eastern Tennessee.

S. F. Crecelius has been appointed city engineer of El Paso, Tex. Other appointments include those of **Hal G. Stacy** and **W. E. Stockwell** as assistant city engineers.

Obituary

Felix J. Weller, founder of the Weller Mfg. Co. and its active head until his retirement four years ago, died May 12, 1930, at San Bernardino, Cal., at the age of 69. He came from Saxony in 1862. In 1886, he entered into the manufacture of elevating, conveying and power transmission equipment, in Chicago.

Walter Smart McKee, president of the Kensington Steel Co., Chicago, Ill., died recently of pulmonary thrombosis which followed an operation for removal of appendix. Funeral services were held at Chicago on Friday, May 23. Mr. McKee was one of the pioneers in the manganese-steel casting business. He had been actively and prominently identified with the development of that branch of the steel industry for the past 30 years. He was a member of several prominent Chicago clubs as well as the American Iron & Steel Institute, American Society of Mechanical Engineers and American Mining and Metallurgical Engineers.

Coming Events

June 9-12, 1930. Colorado Springs, Colo. Sixth annual convention, National Fertilizer Association at Broadmoor Hotel. Charles J. Brand, secretary, 616 Investment Bldg., Washington, D. C.

June 10, 1930. Chicago, Ill. Meeting, Gypsum Association, Bismarck Hotel. Henry J. Schweim, executive secretary, 211 W. Wacker Drive, Chicago.

June 12-21, 1930. Delavan, Wis. Fifth annual Institute, American Red Cross. Lake Lawn Hotel. Dr. H. W. Gentles, director, 616 S. Michigan Ave., Chicago, Ill.

June 16-25, 1930. Berlin, Germany. World Power Conference. World Power Conference Program Committee, Room 818, 29 W. 39th St., New York, N. Y.

June 23-27, 1930. Atlantic City, N. J. Annual Meeting, American Society for Testing Materials.

June 24, 1930. Cleveland, O. Portland Cement Association regional safety meeting, at Hotel Cleveland. A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

June 26, 1930. Washington, D. C. Portland Cement Association regional safety meeting, at Hotel Raleigh. A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

July 1, 1930. Detroit, Mich. Portland Cement Association regional safety meeting, at Book-Cadillac Hotel. A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

July 2-10, 1930. Scarborough, England. Exhibition of Quarrying and Building Contractors' machinery and materials. Exhibition Organizers, 53 Broad St., Birmingham, England.

Sept. 9, 1930. Seattle, Wash. Portland Cement Association regional safety meeting, at New Washington Hotel. A. J. R. Curtis secretary, 33 W. Grand Ave., Chicago, Ill.

Sept. 16, 1930. San Francisco, Cal. Portland Cement Association regional safety meeting, at St. Francis Hotel. A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

Sept. 29-Oct. 3, 1930, Pittsburgh, Pa. Annual congress and exposition. National Safety Council, William Penn Hotel. W. H. Cameron, managing director, 20 N. Wacker Drive, Chicago.

Oct. 6, 1930. Washington, D. C. Sixth International Road Congress under auspices American Road Builders' Assn. Charles Upham, engineer-director, National Press Bldg., Washington, D. C.

Oct. 7-10, 1930. Washington, D. C. Sixth International Road Congress under auspices American Road Builders' Assn. Charles Upham, engineer-director, National Press Bldg., Washington, D. C.

Dec. 1-6, 1930. New York, N. Y. National Power Show, Grand Central Palace.

Jan. 27-29, 1931. St. Louis, Mo. Annual convention National Sand & Gravel Assn., Hotel Jefferson. V. P. Ahearn, executive secretary, Washington, D. C.

Develops New Dry Admixture for Use with Portland Cement

THE Kraus Process, Inc., 110 W. 40th St., New York, N. Y., has developed a dry admixture to be used with Portland cement in connection with mortar, and in concrete mixes. The admixture is made of clay and lime, treated by a patented process. The outstanding characteristics produced by the use of this admixture are: a very plastic mortar and concrete; a much higher sand-carrying capacity with none of the objectionable features of the grease plastics; a much denser and more uniform mixture of concrete with a very low penetrability to liquids; an increase in the bulk volume of the mix.

Unlike some of the admixtures that are being used, this one contains no deteriorating elements for, in addition to producing plasticity or workability, it materially increases the strength of the mix and maintains it throughout the life of the concrete. This admixture functions to neutralize any free lime present in Portland cement. It is possible to manufacture this admixture at a cost to the contractor of about the price of Portland cement itself—a most important consideration.

One of the large cement companies reports: "This mixture of corrective with the cement makes the most plastic mortar that we have ever tested in this laboratory."

In these tests noted in the table at the bottom of the page, the corrective was used as a substitution for cement. If used as an admixture the values are increased in considerable proportion.

Age at Test (*Mixture: 1 part to 3 parts sand*)	Tensile Strength, (*Lb.*)	
	Straight Cement	80% cement 20% corrective
1 day	200	245
3 days	270	335
7 days	355	427
28 days	413	530
	Compressive Strength, Lb.	
3 days	1433	1672
7 days	2149	2749
28 days	2927	3500
	Permeability	
Grams of water forced through a 1-in. thick 1—3 mortar in 48 hr. by 40 lb. per sq. in. pressure	6.785	1.9570

Phoenix Manufacturing Co. Buys Graver Corp.

Announcement is made by Edward N. Gosselin, president of the Phoenix Manufacturing Co. of the purchase on May 1 from the Graver Corporation of its steel-tank, water-treating and steel-plate construction business, including the plant at East Chicago, Ind. The Phoenix company will operate the plant and business under a wholly-owned subsidiary company to be known as the Graver Tank & Manufacturing Corp.

The Graver Corporation, under the management of the Graver family, have been in the tank and steel-plate construction business for over fifty years and are one of the best known concerns in the industry. The Graver brothers have joined the new interests and they will be part of the official family of the new Phoenix subsidiary.

The new organization contemplates a marked increase in the scope of its operations, thus enlarging its field of service, and is already planning additions and improvements to make the plant one of the most modern in the country.

The new company will maintain branch sales offices in Chicago, New York, Dallas, Texas, St. Louis, San Francisco, and several other large centers. The general offices will be located at East Chicago, Ind.

Pick Hanford Mac Nider as New Envoy to Canada

Hanford MacNider, former assistant secretary of war, has been appointed minister to Canada by President Herbert Hoover.

Mr. MacNider's selection has met with Canadian approval, and President Hoover has forwarded the nomination to the Senate. The new envoy comes from Mason City, Ia., where he is at present engaged in the banking business. Mr. MacNider had long been a figure in the cement industry. Until recently, he headed the Northwestern States Portland Cement Co., of Mason City, a position which he assumed upon the death of his father, C. H. McNider, one of the founders of the company.

Former President Coolidge appointed Mr. MacNider assistant secretary of war in 1925 and he served in that capacity until 1928 when he resigned to return to Iowa.

Mr. MacNider has been actively engaged in American Legion affairs and is a former national commander. He was a National Guard officer before the war and served with the Second division overseas. He is a wearer of the D. S. C., is 40 years old and was made national commander of the American Legion in 1921.

Mr. MacNider will fill the vacancy left by the resignation last fall of William Phillips, a career man in the state department foreign service.

Chase Bag Co. Absorbs Concern at Philadelphia

Purchase of the Philadelphia Bag Co. and its subsidiary, the Penn Bag Co., by the Chase Bag Co. of New York, N. Y., has been announced. The Philadelphia Bag Co. was established in 1910, taking over the business of John T. Bailey & Co., and later forming the Penn Bag Co. This affiliation, therefore, brings together two of the oldest bag manufacturing companies in the industry.

The company will retain the services of William N. Morice, president of the Philadelphia Bag Co., as manager of this factory.

Inland Awards Electric Contracts on Huge Job

Contracts for the electrification of the new railway of the Inland Lime & Stone Co. on the eight-mile line from its quarry to Seul Choix harbor, also the installation of electric lighting and telephone service for the entire operations, have been awarded to the Needham Electric Co. of Escanaba, Mich. Trolley wires and other fixtures will be installed for the operation of the electric railway, which will be used for hauling quarry products to the docks, from where shipments will be made by boat to other Great Lakes ports. The Cliffs Power Co. will supply the current for this all-electrically-operated industry. Construction activity is well under way on the project. Four contractors, employing about 400 men, are engaged in the dredging of the harbor and construction of docks, railway and quarry plants.

Sand and Gravel Safety Contest Interest Grows

Increasing interest is being shown in the 1930 Sand and Gravel Safety Contest by producers everywhere. Already 77 plants have been enrolled by the U. S. Bureau of Mines as compared with only 26 plants entered in 1929. Those who are active in promoting safety work in the sand-and-gravel industry feel, however, that the 1930 enrollment, with its nearly 200-per cent increase over last year's, is still not sufficiently representative of the industry.

The National Sand and Gravel Association is actively promoting interest in this form of safety work, and hopes to enroll the plants of every one of its members. The rules have been modified so that the plant of every association member, regardless of size, is eligible for the contest.

The U. S. Bureau of Mines, under whose supervision the contest is being held, has announced that applications are still being accepted. The necessary forms can be obtained from the bureau or from the association.

Engineers Study Stains on Structural Materials

The Western Society of Engineers, with headquarters in Chicago, recently formed a Mineral Industries Section. The committee in charge of this new section consists of C. C. Whittier, E. J. Lednum, A. J. Hoskin, and M. M. Leighton. The first meeting of the Society under the auspices of this section was held Monday evening, May 26, when Dr. H. C. Peffer, head of the School of Chemical Engineering, Purdue University, spoke upon "Staining and Efflorescence of Building Stone and Other Materials," illustrating his talk with slides. He explained in detail the lengthy research in this subject that has been conducted at Purdue and which proves that such blemishes on buildings are due exclusively to the invasion, by water, of the construction materials that lie above or behind the face material, be it stone or brick of any sort. Such water dissolves salts from the other materials and the solutions migrate, by capillarity or hydrostatic pressure, through the pores of the facing materials, frequently absorbing other substances from the stone or brick, until the exterior of the wall is reached, where evaporation takes place, and the chemicals remain as bloom on the surface. Rational architectural design and engineering construction will positively forestall such blemishes.

New Camden, Ark., Plant Starts River Operation

The Standard Gravel Co., which for years has operated a plant near Prescott, Ark., is now operating its new 150 t.p.h. capacity plant on the Ouachita River near Camden, Ark. This is one of the most complete and modern plants in Arkansas. A new dredge with a 10-in. Amsco pump driven by a 140-hp. Fairbanks-Morse Diesel engine feeds the material to 200-ton capacity wooden barges which are hauled to the plant by a new tug boat which is also driven by a Diesel engine of the same make. An American Hoist & Derrick Co. stiff-leg derrick, handling a Williams 1½ cu. yd. clamshell bucket, unloads the barges.

The plant is of timber construction with concrete foundations and has a bin capacity of 300 tons. Sizing of the material is done by a 5-ft. by 16-ft. Telsmith heavy-duty revolving screen and a No. 8 Telsmith sand settling tank. Construction of this plant was begun late in 1929. The entire operation was designed by J. W. Sanders, president of the company.

Hold Annual Red Cross Institute June 12 to 21

The American Red Cross will hold its fifth annual institute June 12 to 21 at the Lake Lawn Hotel, Delavan, Wis. The ten days will be devoted to practical instruction in first aid to the injured, life saving and water safety, swimming and diving, boating and canoeing, and kindred subjects. Regular classes will be organized, and work will begin at 8:15 every morning.

The institute is conducted at cost, all instructors serving without compensation. A registration fee of $5 is required to cover the many incidental expenses. The classes are open to both men and women. Recreational programs are planned for the evenings. Full particulars may be obtained by addressing the American Red Cross, 616 So. Michigan Ave., Chicago, Ill.

Lima, O. Firm Acquires Brownhoist Co. Foundry

The Ohio Steel Foundry Co., Lima, O., has purchased the steel foundry department and the steel castings business of the Industrial Brownhoist Co. of Cleveland. The deal involved close to $2,000,000 and gives to the Lima firm a plant in which 200 men are employed.

In addition to the heavy castings foundry in Lima, employing 550 men, the company also own a plant at Springfield, employing about 400 men, which is devoted to the manufacture of smaller castings and steel, making the payroll over 1,150 men.

Financial News

The information contained in these financial pages is given with the understanding that any statement on the part of this magazine or any of its staff, as to the responsibility or standing of any person, firm or corporation, or as to the value of any property or securities is a mere expression of opinion, given as a matter of service to the readers of PIT AND QUARRY, *for which no responsibility in any way is to attach to this magazine or to any of its staff.*

Financial Position of Standard Paving Strong

Standard Paving & Materials, Ltd., producer of crushed stone, sand, gravel and other building materials, has reported net earnings of $554,269 for the fiscal year ended March 31, 1930, equal to $3.35 per no-par common share, after dividends on the preferred stock. The preferred dividend has been paid regularly since the formation of the company on January 24, 1929, and the common stock is on a $2 annual basis.

The balance sheet dated March 31, 1930, showed current assets of $1,049,239, or over five times current liabilities of $206,437. The financial position of the company was strong—cash, call loans and marketable securities (bonds) being two and three-quarters times total current liabilities.

The balance sheet indicated total book value of $536,778 (including $12,607 reserve for contingencies, but excluding $633,025 good will, $50,000 patents and $70,240 organization expense) applicable to the 104,872 no-par common shares, or $5.12 per share.

International Salt Co. Changes Capitalization

On May 21, 1930 the directors of International Salt Co. voted to call a special meeting of the company's stockholders on June 17, 1930 to act on changing the capital stock from $100 par value to no-par value and issuing three no-par shares for each $100 par share outstanding. The number of shares would be increased from 60,000 to 240,000. Subject to the ratification of this by the stockholders the company proposed to offer 60,000 additional shares of new no-par stock to shareholders at $36 a share in the ratio of one new share for each three new no par shares held. The proceeds from the sale of new stock would be used to finance the acquisition of Sterling Salt Co. and for other corporate purposes.

The directors declared a dividend of $2 a share on the present $100 par shares payable July 1 to holders of record June 16. Heretofore dividends at the rate of $1.25 a share quarterly were disbursed.

In announcing the action of the board of directors, Mortimer B. Fuller, president, said in part:

"Increased payment to stockholders is a reflection of the growth in the company's earnings and business. Properties of the company are thoroughly modern and in excellent condition, due to reinvestment of earnings in past years. It will therefore be possible to pay out in dividends a larger proportion of earnings in the future than has been advisable in the past.

Asbestos Corp. President Opposes Reorganization

Lieut. Col. Robert F. Massie, president of Asbestos Corp., Ltd., stated that operation during the past six months has indicated that there is a vast body of good rock available which has a fairly good quality of asbestos. He said the management is determined to prevent a reorganization of the company, if possible, although admitting that the market for the company's products is in a disorganized state at present. The suit against the Keasby-Mattison Co. may not come up until fall, although it is hoped a hearing may be obtained sometime this month.

At the annual meeting of the company Jacob Nicol, Phillipe Paradise and R. O. Sweezey were elected directors, succeeding J. W. Cook, P. S. Ross and H. E. Mitchell.

Penn-Dixie Cement Sales Volume Reported Higher

Pennsylvania Dixie Cement Corp. reports for 12 months ended March 31, 1930, net income of $329,136 after depreciation, depletion, interest and federal taxes, equivalent to $2.42 a share on $13,588,800 of 7-per cent preferred stock.

Consolidated income account of Pennsylvania-Dixie Cement Corp. and subsidiaries for 12 months ended March 31, 1930 follows: Profit $2,479,723; depreciation and depletion $1,393,314; interest $700,285; provision for federal taxes $56,988; net profit $329,136.

Company's officials report that sales volume for the first quarter of the current year was slightly greater than for the same period last year. Sales price was less than in 1929 because shipments were largely on contracts booked during the low-price period last summer and autumn.

Total cost, however, was reduced more than the shrinkage in price so that the net income showing was somewhat better than last year. As these old low-priced contracts are completed, benefit of the restored price level will become more apparent in the near future.

Foreign cement continues to have an adverse effect on the domestic industry, according to the company's officials. They believe it is of the utmost importance that Congress in its final disposition of the tariff bill give the cement industry tariff protection.

As of March 31, last, current assets were in the ratio of 12 to 1 to current liabilities. Cash was more than $1,000,000 higher than a year ago while inventories were nearly $500,000 lower. Receivables were also lower.

CURRENT DIVIDENDS

COMPANY	CLASS OF STOCK	DIVIDEND RATE	HOLDERS OF RECORD	PAYABLE	COMPANY	CLASS OF STOCK	DIVIDEND RATE	HOLDERS OF RECORD	PAYABLE
Alpha Portland Cement	Preferred	1¾% qr.	June 1	June 15	Lawrence Portland Cement	.....	1% qr.	June 14	June 30
Canada Cement	Preferred	1⅝% qr.	May 28	June 30	Material Service Corp	.....	$.50 qr.	May 15	June 1
Canada Paving & Supply	1st Pfd.	1¾% qr.	May 15	June 1	Metropolitan Paving Brick	Preferred	$1.75 qr.	June 15	July 1
Cleveland Stone Quarries	Common	$.75 qr.	May 15	June 1	Metropolitan Paving Brick	Common	$.50 qr.	May 15	June 1
Cleveland Stone Quarries	Common	$.25 extra	May 15	June 1	National Brick of Laprarie	Preferred	$.75 qr.	May 31	June 15
Cleveland Builders Supply	Common	$.50 qr.	June 15	July 1	Newago Portland Cement	Preferred	$1.75 qr.	June 26	June 30
Consumers Co.	Pr. Pfd.	$1.50 qr.	June 15	July 1	New York Trap Rock	Preferred	$1.75 qr.	June 20	July 1
General Asphalt	Preferred	1¾% qr.	May 15	June 1	Peerless Cement	Preferred	$1.75 qr.	June 20	June 30
General Asphalt	Common	$1.00 qr.	May 28	June 15	Raybestos Manhattan	Common	$.65 qr.	June 2	June 16
Indiana Limestone	Preferred	1¾% qr.	May 20	June 1	Superior Portland Cement	Class A	$.27½ M	May 23	June 1
International Cement	Common	$1.00 qr.	June 11	June 30	Texas Gulf Sulphur	.....	$1.00 qr.	June 3	June 15
Johns Manville	Preferred	$1.75 qr.	June 11	July 1	United States Gypsum	Preferred	$1.75 qr.	June 15	June 30
Johns Manville	Common	$.75 qr.	June 25	July 15	United States Gypsum	Common	$.40 qr.	June 15	June 30
International Salt	Common	$2.00	June 16	July 1	Virginia-Carolina Chemical	Pr. Pfd.	1¾% qr.	May 17	June 1
Kentucky Rock Asphalt	Preferred	1¾% qr.	May 15	June 3					

Traffic News and Comment

Howell Bill Criticized by Shipping Interests

Reference has been made recently to efforts being made by certain interests to amend Section 15a of the Transportation Act. The Howell bill is being subjected to severe criticism on the part of both carriers and shippers. It is claimed by some that the bill is a forerunner of government control, if not of actual government operation. One of the objections set forth by the shipping interests is that the bill continues the provision for the making of freight rates on value only and, while the value ascertained in accordance with the bill is called a "rate base," nevertheless the rate base value is the sole criterion for fixing the general level of the rates. This feature of the present law has been condemned by shipping interests in the past who have advocated the recognition of other principles, such as the ascertainment of a proper sum to enable the carriers to function efficiently, meet the future transportation requirements of the country and secure adequate capital at reasonable rates of interest.

The bill also continues the "recapture" principle which has so often been condemned. It is claimed that the recapture principle works with great inequality in the demands that result upon various carriers. It sometimes penalizes minor carriers for temporary periods of prosperity, and results in inducing other carriers to make excessive expenditures which may be classed under "operating expenses." Perhaps the most objectionable feature of the bill is the purpose of using the recapture fund to bring about ultimate government ownership of the railroads. The excess income held in trust by the government would be invested in extensions, equipment and other properties which would result in a trust in favor of the government. Congress would at all times have power to administer this fund or change the conditions surrounding it and the result would be that the government would own a part of the railroad properties, which would be in many cases intermingled with the properties owned by the railroad companies themselves. The remaining one-half of the excess earnings, after 5 per cent of the rate base is reached, would be used to retire securities of the carriers, which would, of course, have the effect of reducing the private interest in the properties of the carrier and at the same time increasing the government interest therein.

Undoubtedly many years would be required to bring this about. However, the fact remains that the ultimate result would be a mixture of railroad and government interests in the properties. This would be a step in the direction of government ownership and operation. Congress would have the power to provide for operation of any properties which are held in trust for the government.

Certain interests apparently see in this bill an opening wedge looking toward legislative experiments with a view of government ownership and operation of railroads.

Uniform Bill of Lading Conditions Worked Out

New terms and conditions necessary to bring the uniform bill of lading into conformity with the revised statutes have now been worked out by the committees of the American Railway Association and the National Industrial Traffic League. Section 2 (B) has been revised to read as follows:

"Section 2 (b). As a condition precedent to recovery, claims must be filed in writing with the receiving or delivering carrier or carrier issuing this bill of lading, or carrier on whose line the loss, damage, injury or delay occurred, within nine months after delivery of the property (or, in case of export traffic, within nine months after delivery at port of export) or, in case of failure to make delivery, then within nine months after a reasonable time for delivery has elapsed; and suits shall be instituted against any carrier only within two years and one day from the day when notice in writing is given by the carrier to the claimant that the carrier has disallowed the claim or any part or parts thereof specified in the notice. Where claims are not filed or suits are not instituted thereon in accordance with the foregoing provisions, no carrier hereunder shall be liable, and such claims will not be paid."

In connection with Section 7, the face of the bill of lading will be amended to read:

"Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:

The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

.....

(Signature of consignor)"

Section 7 has been revised to read as follows:

"The owner or consignee shall pay the freight and average, if any, and all other lawful charges accruing on said property; but, except in those instances where it may lawfully be authorized to do so, no carrier by railroad shall deliver or relinquish possession at destination of the property covered by this bill of lading until all tariff rates and charges thereon have been paid. The consignor shall be liable for the freight and all other lawful charges, except that if the consignor stipulates, by signature, in the space provided for that purpose on the face of this bill of lading that the carrier shall not make delivery without requiring payment of such charges and the carrier, contrary to such stipulation, shall make delivery without requiring such payment, the consignor (except as hereinafter provided) shall not be liable for such charges. Provided, that, where the carrier has been instructed by the shipper or consignor to deliver said property to a consignee other than the shipper or consignor, such consignee shall not be legally liable for transportation charges in respect of the transportation of said property (beyond those billed against him at the time of delivery for which he is otherwise liable) which may be found to be due after the property has been delivered to him, if the consignee (a) is an agent only and has no beneficial title in said property, and (b) prior to delivery of said property has notified the delivering carrier in writing of the fact of such agency and absence of beneficial title, and, in the case of a shipment reconsigned or diverted to a point other than that specified in the original bill of lading, has also notified the delivering carrier in writing of the name and address of the beneficial owner of said property; and, in such cases the shipper or consignor, or, in the case of a shipment so reconsigned or diverted, the beneficial owner, shall be liable for such additional charges. If the consignee has given to the carrier erroneous information as to who the beneficial owner is, such consignee shall himself be liable for such additional charges. Nothing herein shall limit the right of the carrier to require at time of shipment the prepayment or guarantee of the charges. If upon inspection it is ascertained that the articles shipped are not those described in this bill of lading, the freight charges must be paid upon the articles actually shipped."

Section 9 (d) is to be amended by the addition of a clause to conform to the decision of the Commission in Docket 4844, reported in 156 I. C. C. 188.

The new conditions will be published in supplement to the Consolidated Classification in the near future and if new supplies of bill of lading forms are necessary at this time only a limited quantity should be obtained.

New Complaints Filed

No. 23412—Farber Sheet Metal & Roofing Co. alleges unreasonable rates on roofing slag from Hokendaqua, Reading and Sweedland, Pa. to Pawtucket, East Greenwich and Rumford, R. I., and Sterling, Conn. Asks rates for the future and reparation.

No. 23416—Crane Enamelware Co. alleges unreasonable rates on molding sand from Schenectady and other New York state points to Chattanooga, Tenn. Asks rates for the future and reparation.

No. 23421—The Fulton Sylphon Co. alleges unreasonable and unapplicable rates on molding sand from Hardy and Sandale, Ind., to Knoxville, Tenn. Seeks rates for the future and reparation.

No. 23442—The Portland Co. alleges unreasonable rates on sea or core sand from Provincetown, Mass., and Davisville, R. I. to Portland, Me. Seeks rates and reparation.

No. 23446—Swayne Robinson & Co. alleges unreasonable rates on moulding sand from points in Ohio to Richmond, Ind. Asks for rates for the future and reparation.

Review of Foreign Practice

Study Action of Trass in Lime-Cement Mortars

Researches to determine the action of *Si-Stoff*, trass and diatomaceous earth under the influence of lime water, lime-paste and cement mortar lead to the following conclusions: (1) The influence of lime upon trass consists almost solely in the formation of calcium silicate. (2) On the other hand, from *Si-Stoff* and lime are formed calcium-sulfoaluminate, calcium silicate and calcium aluminate. (3) In lime and cement mortars the above-mentioned lime compounds are formed in only slight amounts, especially when the mortar dries quickly and takes up carbon dioxide. Only with longer action of water are greater amounts of lime gradually formed into compounds. The increase in the combining of lime and the hydrolytic decomposition of cement is dependent on the amount and on the lime-content of the water.—Dr. P. Mecke in *Tonindustrie-Zeitung* 54:444-4, March 31, 1930.

New Barite Discovery in Transcaucasia Reported

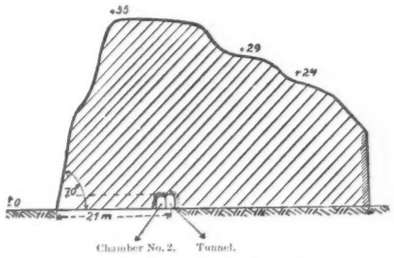
A new deposit of barite was recently discovered along the Passikwara river in the district of Abkhasia in Transcaucasia, not far from the line of the proposed Black Sea railroad, according to *Kohle und Erz* (Berlin). The vein has an average thickness of about 3.5 meters or about 11.5 ft.; in places it amounts to almost 20 ft. The color of the barite varies from snow white to rose. The deposit is estimated to contain 12,000,000 tons.

Build New Cement Plant at Villaluenga, Spain

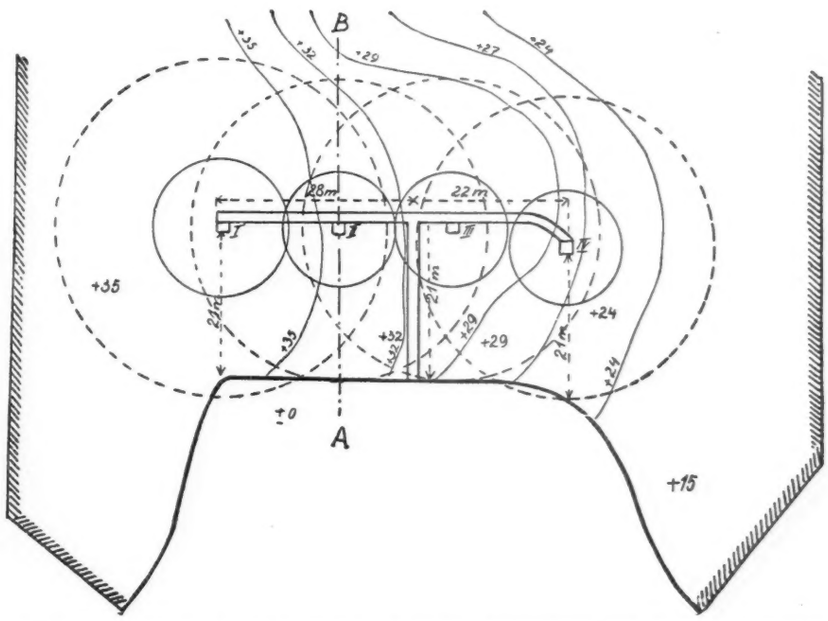
The Compania General de Asfaltos y Portland Arland, pioneer in Portland cement manufacture in Spain, has recently erected a modern mill at Villaluenga in the province of Toledo, designed by Spanish and American engineers and equipped with American machinery. It operates by the dry process. Calcareous marl and clay are obtained from a quarry at the plant site, and limestone is quarried at a point 25 kilometers distant and shipped to the plant. Marl is passed through a jaw crusher and to a revolving screen. Minus 1-in. (25-mm.) material goes directly to a rotary dryer, and plus 1-in. material passes through a roll crusher and thence to the dryer. Limestone is crushed in a gyratory crusher and passes to a second dryer. The marl, limestone and clay are then fed through automatic-weighing devices to a 7-ft. by 26-ft. compound mill driven by a 500-hp. synchronous motor, and the product is elevated to correcting tanks above the kiln. Calcining is done by a 10-ft. by 165-ft. rotary kiln, producing 250 tons daily, followed by a 9-ft. by 64-ft. rotary cooler. Clinker is conveyed to a storage building, and later withdrawn to a finish-grinding mill of the same size as the raw-grinding mill, and the ground cement passes to the bagging department. The plant and quarry are electrically driven from power generated by waste-heat boilers and a turbo-generator.—*Ingenieria Internacional* (New York) 18:29-31, Jan. 1930.

Make Huge Tunnel Blast in German Basalt Quarry

A mammoth blast bringing down a mass of stone estimated at 156,000 to 170,000 cu. yd. was recently made at the quarry of the Immenreuth Basalt Works. The quarry is situated on a hill known as the *Rothenhof* and the stone is a hard material with a crushing resistance of 51,000 to 54,000 lb. per sq. in. In the southern part of the hill a tunnel 70 ft. long was driven, divided at right angles into two lateral tunnels 72 ft. and 88 ft. long respectively, the tunnels being 5½ ft. high and 4 ft. wide. A blasting chamber was placed at each end of the cross adit and two middle chambers evenly spaced along the tunnel length. The only explosive used was Chloratite 2, an explosive of medium *brisance* or bursting power similar in effect to Ammonite 2, and a charge of 17,930 lb. was distributed between the four chambers. The primers used were low-tension detonator fuses having a resistance of 1.7 ohm and with rubber-insulated copper wires. The charges in each of the chambers were initiated by 18 detonators containing a total of 80 lb. of fulminate of mercury. The sealing was begun by bricking but as this was delayed by inclement weather all empty spaces were filled up with sand bags filled with rubbish and empty explosive boxes filled with chips of stone.—*Quarry & Surveyors' & Contractors' Journal* (London), April, 1930, pp. 128-132.



Cross section through basalt quarry



Construction of the effect diagram. Note the destructive and shattering circles.

Keystone State Crushed-Stone Men Gather at Harrisburg, Pa.

Members of the Pennsylvania Crushed Stone Assn. met for their regular meeting and luncheon on May 23 at the Hotel Penn Harris in Harrisburg. President F. T. Gucker presided.

A. T. Goldbeck, director of engineering of the National Crushed Stone Assn., appeared before the meeting to discuss problems in connection with the strength of concrete under varying conditions. He spoke at length on the results of his research work with various aggregates.

The Association expressed its approval of a proposed standard sales-contract form for the entire industry. This form has been adopted by several sand-and-gravel producers in western Pennsylvania and is expected to find favor with all aggregates producers in the state. Briefly, the form covers the terms of the sale and specifically describes the job on which the material is to be used.

A plan for a credit bureau to serve all aggregates producers in the state, proposed by the American General Contractors Assn., was approved in principle, but details were not discussed. The plan will be studied by individual members of the Association and will be brought up for consideration at a future meeting.

Several members expressed themselves as being heartily in favor of a bureau which would supply credit information on purchasers of aggregates. It is felt that lack of complete credit data might lead to unfortunate situations which could be avoided with a general bureau.

Considerable interest was shown in a compilation of freight rates made by a group of producers in the western section of the state.

Following the morning session, the meeting was adjourned for luncheon where informal discussion was continued. Two members of the Pennsylvania Department of Highways were guests of the Association at luncheon. They were W. A. Van Duzer, assistant chief engineer, and H. S. Mattimore, engineer of tests. Both joined the discussions and answered many questions relative to the state road-building program.

Individuals attending the meeting expressed themselves optimistically on business conditions in the industry in Pennsylvania. The extensive 1930 road-building program is getting well under way, assuring a satisfactory market for aggregates.

Telegrams were received by Secretary P. B. Reinhold from members of the Association who were unable to attend the meeting. Those present were:

Members: F. T. Gucker, John T. Dyer Co., Philadelphia, Pa., president; P. B. Reinhold, Reinhold & Co., Inc., Pittsburgh, Pa., secretary; W. M. Andrews, Lake Erie Limestone Co., Youngstown, O.; W. W. Duff, Lake Erie Limestone Co., New Castle, Pa.; H. B. Allen, General Crushed Stone Co., Philadelphia, Pa.; John Rice, Jr., General Crushed Stone Co., Easton, Pa.; F. W. Cramer, York Valley Lime & Stone Co., York, Pa.; A. T. Goldbeck, National Crushed Stone Assn., Washington, D. C.

Associate Member: E. T. Wolfe, E. I. du Pont de Nemours Co., Philadelphia, Pa.

The small attendance—smaller than at any meeting since the organization started—is attributed to the fact that the rush season is getting under way and aggregates producers are able to spare little time from business.

Following the formal meeting, several members who were not leaving immediately, gathered to continue the discussions and to exchange views on local problems arising in certain sections of the state.

Vibrating Screen Solves Problem for Missouri Silica-Sand Producer

About 30 miles south of St. Louis, Mo., the Silica White Sand Co. is producing silica sand by both quarrying and underground mining methods. A complete description of this company's operations was published in the Nov. 6, 1929 issue of PIT AND QUARRY. The silica deposit lies practically level, is remarkably pure and of considerable thickness.

Drilling and light blasting are practiced in both the quarry and the mine. Loading of the broken silica sandstone is with tractor-mounted power shovels. The loaded cars are hauled, by gasoline locomotives, about 500 ft. to the screening plant, where the rock is dumped into a hopper which feeds a 3½-ft. by 12-ft. revolving screen with ¾-in. mesh. The oversize, consisting of relatively hard, small lumps, is chuted to a swing-hammer mill which reduces the material to minus ¼-in., a finished sand which is deposited into a gondola car for shipment.

Until early last summer this plant had produced only unscreened sand. Because of the higher market prices for sized silica sand, the owners decided to install additional equipment. Before deciding upon a permanent installation, they experimented with various types of screens. Difficulty was experienced with some screens because they could not handle the continuous stream of ¾-in. material that came, by a belt conveyor, from the primary revolving screen. Finally this investigation led to the adoption and installation of a Universal 3-ft. by 8-ft., type C vibrating screen which has consistently proved successful and is handling about one ton of sand per minute without appreciable wear or special attention.

When the capacity and efficiency of the machine had been definitely established, its bed-plate was dispensed with and the screen itself was suspended by chains and coil springs, as shown in the accompanying illustration. The lower end of the screen is supported by a pulley and rope whereby it is raised whenever a locomotive is required to pass. This operation is simple. This arrangement provides another feature—a steeper screen slope at quick notice, whenever unusually moist material must be handled. The entire unit can be taken down and replaced, when necessary or desirable, in less than 30 minutes.

This screen is manufactured by the Universal Vibrating Screen Co., Racine, Wis. The vibration is effected by rapid rotation of a shaft on which two off-center weights are mounted. This is belt-driven by a 1-hp. motor. The vibrations are elliptical, with the major movement perpendicular to the screen surface. Changes in screen cloth can be made in five minutes.

The manager of the Silica White Sand Co., Ivan T. Aubuchon, speaks highly of this installation.

Vibrating screen suspended by chains, springs and tackle.

Recent Patents

AMERICAN

Burning

Kiln for the manufacture of fused cement. Antoine Bauchere and Gabriel Arnou, Paris, France. No. 1,758,778.

Concrete

Wet-mixing method and apparatus. Frederick D. Pfeffer and Fred Trotter, Fort Dodge, Ia., assignors to United States Gypsum Co., Chicago, Ill. No. 1,758,200.

Automatic control for concrete-mixing machines. John Daniel, Milwaukee, Wis., assignor to Koehring Co., same place. No. 1,759,808.

Crushing and Grinding

Grinding mill. George F. Pettinos, Philadelphia, Pa. No. 7,758,010.

Demountable rotary crusher. Charles M. Stein, Paris, France. No. 1,758,180.

Attrition mill. August Schuchardt, Winona, Minn. No. 1,758,539.

Apparatus for pulverizing materials. Fred H. Daniels, Worcester, Mass., assignor to Riley Stoker Corp., same place. No. 1,759,100.

Pulverizing apparatus. Robert S. Riley and Ollison Craig, Worcester, Mass., assignors to Riley Stoker Corp., same place. No. 1,759,134.

Excavators

Drag scraper. Leslie P. Green, Chicago, Ill. No. 1,759,505.

Slackline excavator. Joshua H. Street, Chattanooga, Tenn. No. 1,759,525.

Attachment to scrapers and scoops for earth and the like. David J. Hill, Auckland, New Zealand. No. 1,759,697.

Materials, Road-Building

Road-building material and method of making the same. Samuel S. Sadtler, Springfield township, Pa., assignor to Amiesite Asphalt Co. of America, Camden, N. J. No. 1,758,913.

Road-building material and method of making the same. Samuel S. Sadtler, Springfield township, Pa., assignor to Amiesite Asphalt Co. of America, Camden, N. J. No. 1,758,914.

Miscellaneous

Discharge chute and deflector. John Daniel, Milwaukee, Wis., assignor to Koehring Co., same place. No. 1,759,807.

Screening

Screening apparatus. William J. Garrison, Ridgway, Pa. No. 1,758,509.

FOREIGN

Cement

Acid cement for concrete. H. de Gaillard & Cie. French 684,915.

Process and apparatus for the manufacture of fused cement. S. Kohut. French 685,027.

Process of manufacture of cement mortar. J. S. Morgan. French 685,067.

Manufacture of cement and phosphoric acid. I. G. Farbenindustrie Gesellschaft. Canadian 299,941.

Manufacture of Portland cement. F. L. Smidth & Co. (Povl T. Lindhard). Canadian 299,985.

Distributing apparatus for cement raw material and the like. Ernst Curt Loesche. German 497,781.

Concrete

Process for manufacture of porous cement products and the like. P. Gloess. French 684,906.

Truck with mixer body for the transport of concrete. J. P. Gillespie. French 685,070.

Concrete mixometer. Lewis A. Perry. Canadian 299,882.

Manufacture of concrete. J. S. Morgan. British 328,030.

Process for preparation of mortar, concrete and the like on the job. Paul Ziegler. German 497,782.

Excavating

Excavating machine. John W. Page. Canadian 299,877.

Excavating shovel. The Hayward Co. (Herman J. Brendlin). Canadian 299,967.

Excavating machine. The Parsons Co. (George A. Vaughn). Canadian 299,980.

Kilns

Charging apparatus for vertical kilns for burning cement, lime and the like. Schwenk Kommandit-Gesellschaft and A. Hauenschied. British 327,679.

Cooler for rotary kiln. Vickers Ltd. German 497,389.

Process for heating of kilns, particularly annular kilns. Karl Rost. German 497,899.

Charging device for shaft kilns. Arno Andreas. German 497,783.

Material Handling

Conveyor belts. Mining Engineering Co., Ltd., and T. G. Nyborg. British 327,751.

Portable crane. I. G. Farbenindustrie-Gesellschaft. German 497,295.

Loading and unloading device. Johannes Scheiber. German 497,485.

Mixing

Improvements in mixing machines. Societe N. V. Grasso's Machinenfabrieken Hertogenbossche Machinefabrick. French 684,795.

Mixing device. African Selection Trust Ltd., Charles Watson Boise and William Russel Degenhardt. German 497,319.

Screening and Separating

Apparatus for separating the constituents of pulverulent or granular materials. A. Beringer. French 684,996.

Centrifugal apparatus for separating and collecting dust or other solid particles from air and gases. C. H. W. Cheltnam. British 327,703.

Rotary screen for centrifugal machines. Fraembs & Frendenberg. Machinenfabrik. German 497,886.

Miscellaneous

Apparatus for drying clay. Baugesellschaft fuer Kunstliche Trocknereien. German 497,692.

Apparatus for electrical prospecting. C. R. Nichols and S. A. Williston. British 327,716.

Process and apparatus for filling in disused workings of mines and the like. K. Baumgartner and F. Schmied. British 327,778.

Wire-rope making machines. E. Edwards, C. Jones and R. Hanson. British 327,867.

Loading of mine cars. J. A. Paisley. British 328,054.

Production of quicklime and sulphur dioxide. A. Fleck and Imperial Chemical Industries Ltd. British 328,128.

Method and device for making disintegrated alumina. Conway von Girsewald and Martin Marschner. Canadian 299,820.

Four-roll grinding mill. Alfred Erasmus Geoffrey MacCallum. Canadian 299,867.

Wallboard manufacture. Canada Gypsum & Alabastine Ltd. (George Miller Thomson). Canadian 299,927.

PIT AND QUARRY *will furnish, at its actual cost, a copy of any patent cited above. A charge of ten cents per copy is made by the U. S. Patent Office, Washington, D. C., and readers may procure a copy directly by addressing the Commissioner of Patents, with payment for copies requested. Postage stamps are not accepted by the Patent office. We will endeavor to obtain copies of foreign patents for our readers but we cannot give assurance in every case for the reason that copies of such patents are not printed for distribution as liberally as are the American copies, nor is there a fixed charge per copy.*

Safety Contest Methods Outlined in New Study

Methods of stimulating employee interest in safety by developing the spirit of friendly competition or the desire to excel are presented in a report entitled "Safety Competition," published by the policyholders' service bureau of the Metropolitan Life Insurance Co. This publication is the seventh of a series of industrial safety leaflets, based on a study of the field of safety engineering and outlining effective methods of applying the principles governing successful accident prevention work.

"Safety Competition" emphasizes the need for arousing interest in safe practices among employees and presents methods of planning and organizing inter-departmental contests which will serve as incentives for safe workmanship.

A copy of this study and the six previous leaflets in the series may be had upon application to the policyholders' service bureau, Metropolitan Life Insurance Co., New York, N. Y.

Legal Information for Operators

Taking Order Not Doing Business, Court Declares

Although a state may enact laws requiring foreign firms to pay taxes or obtain permits to transact interstate business in the state, such laws are void.

For example, in Joseph T. Ryerson & Son v. Schraag, 229 N. W. 733, it was disclosed that a contractor located in Iowa gave an order to a salesman representing a firm in Missouri. The salesman sent the order to his employer who accepted it and shipped the goods. The seller did not comply with the Iowa law requiring persons and corporations, which transact business in the state, to obtain a permit before suit can be maintained in the state. However, under the circumstances the Court held the material man entitled to file the suit, saying:

"It has long been the established rule in this state that, where an order for merchandise is taken in this state and forwarded to another state, which is the home office of the corporation and such order is subject to acceptance or approval by the principal, the contract is not a contract in this state where the order was taken, but is one in the state where the principal resides, and that an action may be maintained on such a contract by the foreign corporation in this state without securing a permit under the statute. . . . The contract made no provision whatever for the performance of any act of a local character within the state of Iowa, such as the placing of said material in the building. . . . The portion of the contract to be performed in this state, to wit, delivery of the material, was merely incidental to the business in which the corporation was engaged, and did not constitute the doing or carrying on of business within this state within the meaning of said statute."

Dealer Credits Payment to an Earlier Account

Generally speaking, if no controversy exists regarding which account a material man shall credit a payment made by a debtor, credit may be given by the creditor to the oldest account. However, if controversy arises, the creditor is bound to prove that the credit was correctly given upon the instructions of the debtor, or from a custom.

For instance, in Shreveport Co. v. Meeks, 126 So. 513, it was disclosed that a contractor had several accounts with a material man. On September 27 the contractor paid the material man $2,000 without indicating just what account should be credited, but intended that it should be applied to a recent account. The material man credited the payment to the oldest account and sued to recover payment of the account which the contractor intended to pay. The only evidence submitted by the material man showing that he had correctly credited the payment was the testimony of his employees that usually all payments made by the contractor were credited to his oldest account.

However, since the contractor testified that, when the payment was made, he instructed the bookkeeper to credit the amount to a particular account, the Court held the material man not entitled to a favorable verdict, and said:

"Plaintiff (seller) admits the payment, but its witnesses testified that, in their prior dealings with Meeks (contractor), it had been their custom to apply payments made by him to his debts of longest standing, and that custom was followed in reference to the payment of September 27th."

When Verbal Promise to Pay Obligation is Valid

A peculiar, well-settled point of law is that a person who verbally agrees to guarantee payment of another person's debt is not bound to fulfill the obligation. However, a verbal agreement to pay one's own debt is valid and enforceable.

For illustration, in Davis Const. Co. v. Petty, 168 N. E. 769, it was disclosed that a contractor entered into a contract with a state highway commission and agreed to construct a paved road for a stipulated amount. He furnished a statutory construction bond and contracted with a gravel firm which agreed to furnish gravel for the construction of the road. Later, when the gravel firm became involved with its creditors, the latter were placed in control and endeavored to fulfill the contract to furnish the gravel. The contractor agreed to pay all persons and laborers who transported the gravel.

Subsequently the contractor refused to pay the laborers and suit was instituted to collect payment.

The counsel for the contractor contended that whatever promises were made were not original promises, but were promises to answer for debts of another and therefore were void. Notwithstanding this argument the higher court held the contractor liable.

Law of Design Patents Not Always Applicable

It is well settled that the United States Patent Office officials have held that design patents are not allowable on machines and do not apply to structures having movable parts.

In other words, some articles of manufacture are incapable of being the subjects of design patents, because their appearance can never really matter to anybody.

On the other hand, while design patents are not intended to protect a mechanical function, or to secure to the patentee monopoly in any given mechanism or manufacture as such, it is immaterial that the subject of the design may embody a mechanical function, provided that the design is pleasing, attractive, novel, useful and the result of invention.

For illustration, in Koehring, 37 F. (2d) 421, it was disclosed that the manufacturer of a concrete mixer filed an application for a design patent claiming that the design was attractive. The Patent Office refused to allow the patent on the grounds that a concrete mixer cannot be pleasing, attractive or ornamental.

The patentee appealed to the United States Court and it is interesting to observe that this Court reversed the Patent Office's decision and, in holding the inventor entitled to a design patent, said:

"Since it is clear that Congress meant the design patent law to apply to tools and mechanisms of utilitarian character, it follows, we think, that it had in mind the elimination of much of the unslightly repulsiveness that characterizes many machines and mechanical devices which have a tendency to depress rather than excite the esthetic sense. In this mechanical age, when machines, engines, and various kinds of mechanisms are transported on our public highways and streets and moved by their own momentum from place to place, it is certainly not undesirable that some of the unsightliness—and, as frequently occurs, frightfulness—of such contrivances be eliminated, if possible. . . . The inventor's design of a truck body and frame for a concrete mixer shows the frame to be so designed as to place the different elements of the whole machine into a more symmetrical and compact whole than was known in the prior art. . . . We conclude, therefore, that the truck body and frame at issue is a proper subject-matter for a design patent, and that the production of the design involved invention."

Insurance Problems Discussed

Revise Fire and Theft Rates for Automobiles

New rates and rules have just been announced for automobile fire and theft insurance. The revised figures represent both a saving in money to the public and a liberalization of standard policy terms. On the average the reduction in rates amounts to about fifteen per cent, though the changes are not uniform for all cities. The entire United States is covered by the change, and the new rules have been adopted by practically all of the stock insurance companies.

While the cut in rates has brought out considerable comment in the insurance trade journals, probably the most important feature of the new "automobile manual" is the changes in rules for writing policies. It is now possible to get policies which fit individual needs more accurately than ever before. The buyer of automobile insurance should give some thought to the improved forms, because only by understanding your risks will you be able to get the policy that fits best.

New Risks Covered

Until quite recently the attitude of both you—the car owner—and the insurance agent was about like this: The risk of which you were most afraid was collision damage, but the rates were so high that you often could not afford to insure; therefore you carried a simple policy against fire and theft and hoped that nothing else would happen to your car. As the world has become more complicated, however, we have realized that an automobile is exposed to many different chances of loss. If you have $500, $1,000 or $2,000 invested in a car, you can not afford to lose so much capital in any manner. The insurance companies have, therefore, been studying all of the risks to which automobiles are subject, and have finally developed a coverage which includes every likely loss at a price no greater on the average than the old limited fire and theft policies.

Collision Changes

In addition to the standard risks of fire and theft, undoubtedly the greatest concern of the motorist is over the chance of collision damage to his car (omitting the risk of legal liability for damage to others, which has been discussed in a previous article). On the average, all cars are in some accident every year. That is, practically every car bumps somebody else, or suffers a bent fender or something, at least once a year; and this frequency of accidents, both big and little, must be faced as part of the bill for the average upkeep of an automobile. Of course, most insurance agents feel, under the new rules, as they did under the old in one way; that is, it is usually uneconomical to carry a full-cover collision policy which would pay for every little dent or scratch, and that it is best to take your own risk on small losses. It is distinctly advisable, however, to insure the risk of a big collision loss, and every car owner should carry some form of collision indemnity. The rates are much lower than they were a year or so ago, and the policy forms are more flexible, so that it is not necessary to spend much money to get fair protection. The common form of policy will contain the "deductible clause." This means that the insurance company pays nothing on little losses and pays the excess over a certain agreed amount on large claims. The amount deductible may be $15, $25, $50, $75, $100, $150, $250 or $500. With so many choices the car owner can certainly make a reasonable decision as to how much of a loss he would care to stand himself and how much he ought to insure.

Convertible Policy

There is a new kind of collision policy which will appeal to conservative people who want good protection but "shy" at the heavy rate for full-cover collision insurance. This is called a "convertible" policy. Under it you pay one-half the full-cover premium. If you wish to present a loss claim at any time, you then pay the other half. In other words, if you do not have a loss you save half the premium and, at the worst, you pay only the standard full-coverage rate.

One of the modern trends in insurance has been a realization that many different things may happen to an automobile. We are not talking vague improbabilities, because these things actually occur. If any one of them is somewhat less probable than fire or theft, the rate will be proportionately lower.

Glass Breakage

The most attractive new coverage is a combination for a flat charge of $3.50 which covers loss or damage from windstorm, tornado, hail, external explosion, earthquake, water damage, riot, strike or civil commotion, damage from falling aircraft and flood. This list includes most of the minor risks to which an automobile is subject. Because of its small premium, it would seem good judgment to carry the extra protection rather than to leave the door open to a possible loss of your entire car.

Another minor coverage which has been greatly developed is automobile glass breakage. Almost every collision involves some broken glass. In addition, windows may be smashed by flying stones, baseballs, the slamming of doors, or the elbows of careless passengers. At the rate of $3 for an open car and $5 for a closed car you may obtain full-coverage against accidental glass breakage.

For the small charge of one dollar per year, your fire-and-theft insurance policy can now be extended to cover the cost of towing in case of breakdown. This addition represents an entirely new departure for the old-line insurance companies. It originates with a desire of the insurers to equalize the public service of certain motor clubs that are in the insurance business, and the policy is written with the intention of offering complete protection to those who wish to keep their indemnity in stock insurance companies.

Depreciation in Value

The new rules now attempt, for the first time, to cope with the problem of the steady depreciation of an automobile in connection with fire and theft insurance. For years insurance companies have been annoyed because, when a person buys a policy, he of course names the present value of his car and he pays a rate for the entire year based on that value. It is well known that a car depreciates steadily. You might buy a policy for $1,000 for instance; and, if your car were lost after ten months you would find that it was worth only $800, and the latter amount is all that you could collect. This regular decline in value will run almost exactly two per cent per month for all types of passenger automobile. In addition, if the manufacturer reduces the list price on his current model similar to yours, your car takes an immediate drop in value proportionate to the cut in price of a new car. Loss adjusters have been settling claims on the basis of these arguments, but the policy holder has never had any allowance in premium because of the declining value. The new rules have equalized this situation by granting a reduction of ten per cent in rate if a rider is put on the policy agreeing that the value is to be reduced two per cent monthly and further reduced in case of change in list price. It would appear that the acceptance of this rate reduction does not weaken the policy legally from the standpoint of the car owner.

England's Machinery and Material Show July 2-10

Announcement has been made by the Exhibition Organizers, Birmingham, England, of the fourth annual Exhibition of Quarrying and Building Contractors' machinery and materials, to be held at Scarborough from July 2 to 10, inclusive.

New Machinery and Supplies

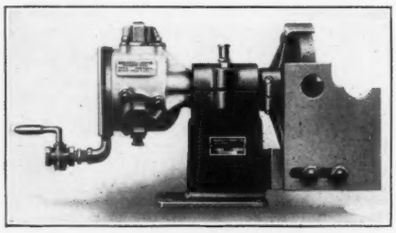
Varied Uses for Bench Type Pedestal Grinder

Ingersoll-Rand Co., New York, N. Y., announces a bench-type pedestal grinder, known as the Type 9, which can be bolted to a bench or a portable air compressor.

The flow of air to the motor is controlled by a hand-operated globe valve. The machine has a free speed of 3000 r.p.m. and is designed to take a vitrified grinding wheel of 6-in. or 8-in. diameter with a ½-in. face. At the end of the grinder spindle, a bit chuck is screwed to take a drill or reamer with a ½-in. straight shank.

The motor has three cylinders, spaced about the center line of the spindle. All deliver power to one crank pin. The three cylinders are interchangeable. The motor operates in a bath of lubricant, so that all moving parts are continuously immersed.

The exhaust is directed through the base of the machine—a feature which



Bench-type pedestal grinder.

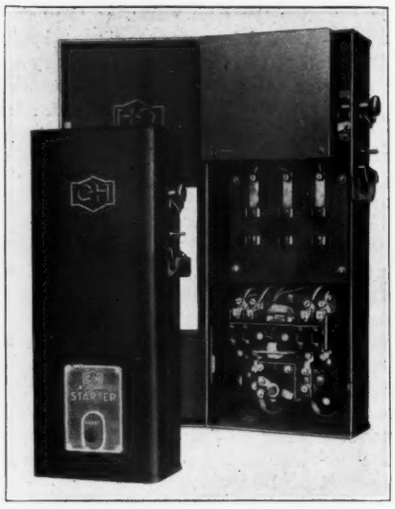
prevents the grindings from being blown into the face of the operator. A steady-rest in front of the wheel aids the operator in holding the work.

On contract work, a grinder of this type proves a very handy machine for grinding or sharpening chisels and picks, squaring up drill-steel shanks, and taking care of the miscellaneous grinding jobs that are usually encountered. Considerable time can often be saved by having a grinder right on the job to do these tasks as need arises.

Fusible Disconnects on New A. C. Motor Starter

Cutler-Hammer, Inc., Milwaukee, Wis., announces the development of a new a. c., across-the-line automatic starter, combined with a fusible disconnect switch in a single steel enclosing case. This new starter may be used in place of the separate starter and fusible disconnect switch requiring less space, simplifying installation and presenting a neater appearance.

A feature is a wiring channel be-



Across-the-line automatic starter.

tween the starter panel and the back of the enclosing case which allows running the connecting wires behind the panel, where they cannot interfere with the operation of the starter. Ample room is provided to bring all of the connecting wires in at either the top or the bottom of the case according to installation requirements. All parts are mounted on a back plate which is easily removed for pulling and placing of line and motor wiring.

The disconnect switch is manually operated from the outside of the enclosing case. A cover interlock prevents opening the cover when the switch is closed and prevents closing the switch if the cover is open, unless the interlock is manually released. An electrical interlock insures that the magnetic contactor of the starter is always open when the disconnect switch is open. The fuse clips are mounted on a slate base, just below the disconnect switch. Fuses are not furnished.

Decrease Poisonous Gas Fumes Following Blasts

One of the most important improvements in du Pont high explosives during the past year was a reformulation of Red Cross extra dynamite which reduces the poisonous gases given off by this explosive to a volume no greater than that produced by the present du Pont gelatin dynamites. This decrease in poisonous fumes has been accomplished without in any way affecting the other characteristics of the explosive and all grades of du Pont red cross extra are now being manufactured on the new formula. There are many mines today using gelatin dynamite where the ammonia-type of dynamite would give excellent execution, its employment having been prevented in the past solely on account of fumes. In such operations, red cross extra can now be substituted for gelatin with marked economy.

As soon as practicable all du Pont gelatins will likewise be manufactured on revised formulas which will effect a decrease in the volume of their poisonous gases. While the present du Pont gelatins cause very little trouble from fumes, the improved gelatins will permit the men to return to the face in a shorter time after the blasting and thus will facilitate speeding up operations and increasing output.

Design Testing Screen for Coarse Aggregates

Heretofore, all testing of large samples of coarse aggregate was done by hand—a long and laborious operation. The only power testing screens on the market today are for small samples of fine aggregate. The Weston testing screen was designed by a producer of crushed stone to meet the present day requirements for accurate testing of large samples of coarse aggregate. The convenience and accuracy of this testing screen suggest its use in crushed-stone and gravel plants, coal tipples and ore-reduction works where accurate sizing is of so much importance.

This testing screen has been in operation for practically two years and the results obtained through its

Testing screen for coarse aggregates.

use have been very satisfactory and profitable. This screen has tested from one to three samples of from 50 lb. to 75 lb. each, from each of approximately 8,000 cars of stone. This has enabled the plant to govern the grading of the aggregate, and to furnish the contractor and engineer with accurate data concerning the aggregate, thus insuring acceptance of the stone without question.

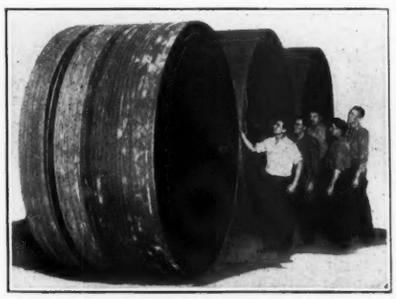
Tests made with the Weston screen as compared with the old hand method, show the Weston screen to be just as accurate as the hand method. In order to run a sample through this screen it is only necessary to run it from two to three minutes. The sieves may then be lifted off for inspection and weighing. Having each size of aggregate in a separate sieve allows testing engineers to make a visual inspection of each size.

The screen is made by the Hendrick Mfg. Co., of Carbondale, Pa.

Install Heavy Conveyor Belt in Michigan Plant

What is said to be the heaviest, thickest conveyor belt ever used has been installed in the new screening plant of the Michigan Limestone and Chemical Co.

The essential features of this heavy belt, made by the Robins Con-



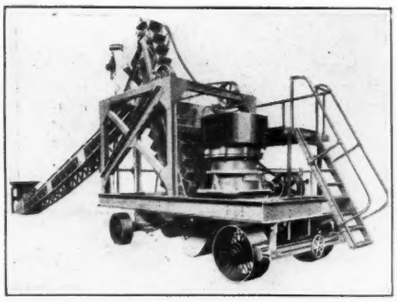
Large, heavy conveyor belting.

veying Belt Co., are as follows: 54 in. wide, stepped-ply construction, 16 plies at the side, 14 plies at the center; top cover, 13/32 in. thick; 42-oz. duck; total thickness, 1¾ in.; length of conveyor, 700 ft. on centers; lift of conveyor, 147 ft.

The conveyor was shipped in three rolls, weighing 21,000 lb. each and spliced on the field in a vulcanizing press to make an endless belt. In spite of its thickness, the belt troughed perfectly without a load when installed.

Mount Gyratory Crusher on New Portable Plant

A portable crushing, screening and loading plant equipped with a gyratory crusher has been announced by the Smith Engineering Works, Mil-



Portable crushing and screening plant.

waukee, Wis., manufacturers of rock, ore and gravel-handling machinery.

The new Telsmith portable will deliver two accurately-sized products to conform exactly with state or county specifications for gravel or hard surfaced roads. The plant may be equipped with a reduction crusher to deliver sand and minus ¾-in. rock, or with a primary breaker to deliver sand and minus 1½-in. material. Since the crusher is in closed circuit with the screen, there is no oversize.

For quarry operations, adding either a primary breaker or a jaw crusher at the foot of the feed conveyor converts it into a two-crusher plant with a large capacity of ¾-in. or 1-in. product. If only one final product is desired, the plant can be furnished with a single-deck vibrating screen and only one finished-product conveyor, the steel conveyor for coarse-finished product being omitted. The second deck for the vibrator and the second finished-product conveyor can be added at any time if it is desired to change to a two-product plant.

Claim New Type Loader Reduces Handling Cost

According to the New England Road Machinery Co., South Boston, Mass., its new-type loader cuts loading costs to a minimum because of its speed—in both loading and transportation—and the fact that it requires only one man for its complete operation.

This new machine is erected upon a crawler and is particularly efficient in handling sand, gravel and stone. It is constructed throughout of the best materials obtainable and is intended to give many years of continuous service even under the most

Crawler-mounted loader.

difficult conditions. This company, which has manufactured material-handling equipment for many years, has embodied its findings in the design of this new loader. Crushers, screens, washers, elevators, feeders and conveyors also are manufactured by this company.

Fairbanks' Invention of Scale to be Celebrated

To commemorate the one-hundredth anniversary of the invention of the modern platform scale by Thaddeus Fairbanks in 1830 business and industrial leaders of the nation, as well as many foreign countries, will gather in the historical city of St. Johnsbury, Vt., on July 4 to pay tribute to the memory of Thaddeus Fairbanks, "father of modern weighing."

Announcement of a three-day celebration of the centennial of the invention of the modern weighing machine, beginning July 4, was made recently in Chicago by W. S. Hovey, president of Fairbanks, Morse & Co., which is the outgrowth of the small scale manufacturing business started a hundred years ago at St. Johnsbury by Thaddeus Fairbanks and his brothers, Erastus and Joseph P. Fairbanks, on an investment of $4,000.

Former President and Mrs. Calvin Coolidge will be guests of honor at the celebration. Mr. Coolidge has a keen personal interest in the affair for the reason that he was at one time a student at the St. Johnsbury Academy which was sponsored and supported by Thaddeus Fairbanks.

The principal feature of the program will be an historical pageant depicting the progress during the last century in the evolution of the modern weighing machine and its profound influence upon human welfare and world commerce. There will also be a notable exhibition of original patent models of scales invented by Fairbanks, which have been borrowed for the occasion from the patent office.

Allis-Chalmers Adopts Group Insurance Plan

Otto H. Falk, president, has announced to Allis-Chalmers employees a group-insurance plan for about 10,000 employees of the company.

This is said to be the largest life-insurance contract ever written in Wisconsin, involving a total of approximately $20,000,000.

In addition to almost 7,000 employees at West Allis, the program will include the plants at Pittsburgh, Pa.; Norwood, O.; Springfield, Ill.; and La Crosse, Wis., and district offices in approximately 50 cities in the United States, Canada, Europe and South America.

Manufacturers' Publications

Each publication listed below contains information of interest to nonmetallic mineral producers. Readers may obtain, without charge—except where a price may be stated—and without obligation, copies of any of these publications by writing directly to the manufacturers who publish them. Please mention PIT AND QUARRY *when writing.*

Cement

A Visit to Volunteer. 8 p., 7 ill. (Volunteer Portland Cement Co., Knoxville, Tenn.) Describes and illustrates the methods of manufacturing regular and high-early-strength Portland cements.

Mortar Perfection. 8 p., 6 ill. (The Carney Co., Carney, Minn.) Describes the use of a cement made for producing brick and tile mortar and shows illustrations of some of the larger construction projects on which it has been used.

Cleaners, Cement-Sack

Nazco Continuous Cement-Bag Cleaner. 4 p., 2 ill. (Bulletin BC. Nazareth Foundry & Machine Co., Nazareth, Pa.) Describes and illustrates a continuous bag cleaner and lists 12 cement companies as users.

Conveyors, Belt

Duplex System for Conveying Materials. 24 p., 21 ill. (Boston Woven Hose & Rubber Co., Cambridge, Mass.) Describes use of two belts on a single conveyor, the inner of duck to carry the power, the outer of nearly-pure rubber to take wear.

Conveyors, Overhead

Palmer-Bee Overhead and Other Conveyors. 80 p. Illustrated. (Catalogue No. 52. Palmer-Bee Co., Detroit, Mich.) A new catalogue of conveyors. Contains many close-up photographs of actual installations, and details of construction.

Conveyors, Pneumatic

Cutting Handling Cost in Shipping Vegetable Potash. 4 p., 5 ill. (Bulletin 519. The Dust Recovery & Conveying Co., Cleveland, O.) Describes and illustrates the use of pneumatic conveying in handling vegetable potash produced by the U. S. Industrial Chemical Co., Baltimore, Md.

Conveyors, Vibrator

The Traylor Electric-Vibrator Conveyor. 4 p., 7 ill. (The Traylor Vibrator Co., Denver, Colo.) Describes and illustrates an electrically-operated conveyor and illustrates interesting installations in the mine and quarry fields.

Drilling

"Figuring Churn-Drill Prospecting Costs." 2 p., 2 ill. (*The Armstrong Driller* for May, 1930. Armstrong Manufacturing Co., Waterloo, Ia.) Gives an interesting analysis of costs of drilling in exploration for minerals.

Dryers

Drying Economically by Direct Heat. 4 p., 2 ill. (Hardinge Co., York, Pa.) Describes and illustrates a single-shell, direct-heat dryer, pointing out the outstanding operating features and methods of manufacturing the unit.

Fire Brick

A Complete Tunnel-Kiln Plant. 24 p., 42 ill. (A. P. Green Fire Brick Co., Mexico, Mo.) Describes and illustrates the new fire-brick plant of this company at Mexico, Mo.

Gears

For the Sake of Your Profits. 2 p., 1 ill. (Traylor Engineering & Manufacturing Co., Allentown, Pa.) Describes and illustrates a shaper for generating spur gears with minimum inaccuracies and announces a new gear-manufacturing service by the company.

Hoists, Skip

"Announcing New Developments in the Field of Skip-Hoisting Equipment." 3 p., 4 ill. (*Link-Belt News* for May, 1930. Link-Belt Co., Chicago, Ill.) Describes and illustrates a new automatic skip-hoist loader.

Lubrication

"The Lubrication of Ring-Oiled Bearings." 3 p., 4 ill. (*Black and White* for June, 1930. E. F. Houghton & Co., Philadelphia, Pa.) Describes and illustrates the lubricating action in ring-oiled bearings and points the way to correct oiling.

Machinery, Electrical

New and Rebuilt Electrical Machinery. 28 p., 31 ill. (The Motor Repair & Manufacturing Co., Cleveland, O.) Describes and illustrates a complete line of new and used motors, motor-generator sets, transformers, ventilating fans and other electrical equipment.

Machinery, Used

Zelnicker's Bulletin. 58 p. (Bulletin 400. Walter A. Zelnicker Supply Co., St. Louis, Mo.) Describes a varied list of machinery and supplies for equipping mines, quarries and sand-and-gravel plants.

Pulverized Coal Systems

"Purfeco" Pulverized Coal Systems. 64 p., 81 ill. (Catalogue No. 4. Pulverized Fuel Equipment Co., Chicago, Ill.) Describes and illustrates complete pulverized fuel systems and describes an engineering and contracting service offered by the company for making installations.

Screens, Vibrating

The S-A Vibrator. 16 p., 25 ill. (Stephens-Adamson Manufacturing Co., Aurora, Ill.) Describes and illustrates a new vibrating screen of the positive-eccentric type, showing details of construction.

Wire Rope

"Building Connecting Link Between Great Lakes and Gulf of Mexico." 13 p., 9 ill. (*The Hercules Record* for May, 1930. A. Leschen & Sons Rope Co., St. Louis, Mo.) Describes and illustrates the use of wire rope in dam and lock construction on the Illinois River in the Lakes-to-Gulf waterways project.

Ready-Mixed Concrete Plants

Rex Central-Mixing Plants. 24 p., 38 ill. (Catalogue No. 185. Chain Belt Co., Milwaukee, Wis.) Describes and illustrates equipment for premixed concrete plants including layouts, mixers, elevators, conveyors, truck mixers and bulk-cement hauling.

New Corporations

Storey Lime Co., Douglas, Ariz. J. T. Sheffield, Puntenney, Ariz.; Alfred Paul, Douglas, Ariz. $100,000.

Radford Limestone Co., Inc., Roanoke, Va. J. H. Chitwood, president. $5,000.

Hot Springs Stone Co., Hot Springs, S. D. Henry Dering, Walter J. Beck, Clifford A. Wilson. $75,000.

Landa Sand & Gravel Co., New Braunfels and Austin, Tex. Harry Landa and Cuthbert Westbrook, owners of Landa Rock Products Co., New Braunfels. $30,000.

Western Massachusetts Sand & Gravel Co., Westfield, Mass. Robert P. Lane, president; Harold W. Augerson, vice-president; Harry W. Gladwin, treasurer. 2,000 shares common.

Batavia Washed Sand & Gravel Co., Batavia, N. Y. W. J. Darch. $20,000 pfd.; 600 shares com.

Highland Sand & Gravel Co., Boston, Mass. George S. Wilbur, Boston, Mass.; Dexter B. Pattison, Dedham, Mass.; Roy J. Foster, Belmont, Mass. 20,000 shares n. p. v.

North Eastern Refractories Corp., Mount Union, Pa. Francis H. Beam, treasurer, National City Bldg., Cleveland, Ohio. To mine and prepare for market clay, sand, gravel, stone, etc., and manufacture brick, etc.

Pittsburgh Gravel Co., Baden, Pa. C. C. Patterson, president; D. M. Campbell, vice-president; P. A. Paulson, secretary-treasurer. Plant and office on Ohio river at Baden. $5,000.

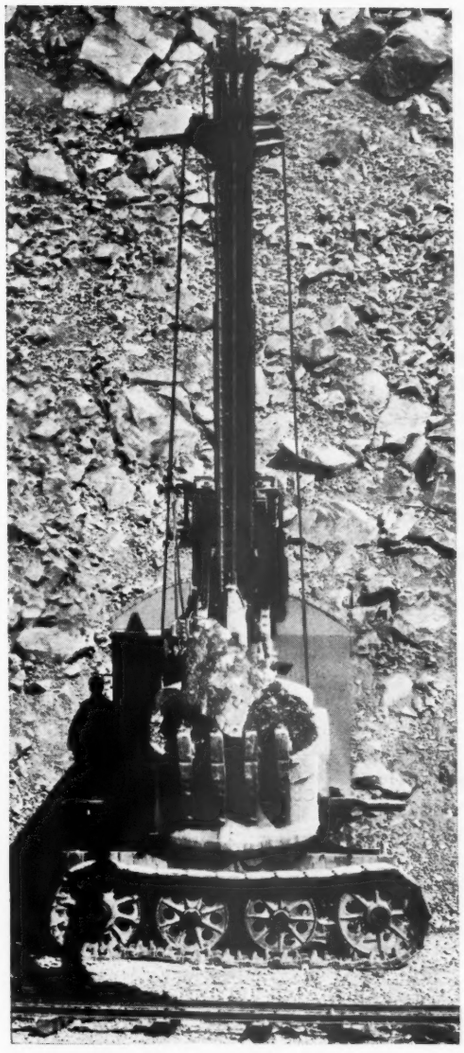
Prairie Sand Co., care of W. T. Findlay Co., 747 Union Trust Bldg., Cleveland, Ohio. 100 shares n. p. v.

Vincennes Sand & Gravel Co., Vincennes, Ind. J. L. Byers, C. E. Byers, E. H. Byers, Ramond Soden. $12,000.

Northwestern Sand & Gravel Co., Rm. 1540, 176 W. Adams St., Chicago, Ill. Paul V. Byrne, A. J. Hewitt. Will build plant at Wayne, Ill. $100,000 and 20,000 shares n. p. v.

Chubbuck Lime Co., 5000 Worth St., Los Angeles, Calif. Lime plant and quarries, Chubbuck, Amboy P. O., Calif. $100,000.

"BRING ME MORE CARS"



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